LODGING

Nos. 81-746 and 81-1172

RECEIVED
SEP 22 1982
OFFICE OF THE CLERK
SUPREME COURT, U.S.

IN THE

Supreme Court of the United States

OCTOBER TERM 1982

CITY OF AKRON,

Petitioner,

—v.—

AKRON CENTER FOR REPRODUCTIVE HEALTH, INC., *ET AL.*,

Respondents.

AKRON CENTER FOR REPRODUCTIVE HEALTH, INC., *ET AL.*,

Cross-Petitioners,

—v.—

CITY OF AKRON,

Respondents.

RESPONDENTS AND CROSS-PETITIONERS' LODGED MATERIALS MEDICAL AND STATISTICAL DOCUMENTS

JANET BENSHOOF
SUZANNE LYNN
NAN D. HUNTER
American Civil Liberties
Union Foundation
132 West 43rd Street
New York, New York 10036
(212) 944-9800

GORDON BEGGS
American Civil Liberties
Union of Cleveland
Foundation, Inc.
1223 West Sixth Street
Cleveland, Ohio 44113
(216) 781-6276

STEPHAN LANDSMAN
Cleveland-Marshall
College of Law
Cleveland State University
Cleveland, Ohio 44115
(216) 687-2328

Attorneys for Respondents and Cross-Petitioners

TABLE OF CONTENTS

Lodged Documents

UNITED STATES GOVERNMENT STATISTICS;
MEDICAL & SCIENTIFIC ARTICLES

Document #	*Documents*
1.	Cates, W., "Legal Abortion and Women's Health: Gains and Losses in the 1970's," study in record in *Planned Parenthood of Kansas City, Missouri v. Ashcroft,* U.S. S.Ct. No. 81-1255 (Pl. Exh. 3 to Cates Deposition, Df. Exh. 1, Transcript on Remand, offered p. 145, admitted pp. 145, 146); subsequently published as "Legal Abortion: the Public Health Record," *Science,* March 26, 1982: 1586-1590.
2.	U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, *Abortion Surveillance 1978,* November, 1980, study in record in *Planned Parenthood of Kansas City, Missouri v. Ashcroft,* U.S. S.Ct. No. 81-1255 (Pl. Exh. 4 to Cates Deposition, Df. Exh. 1, Transcript on Remand, offered p. 145, admitted pp. 145, 146); excerpts, pp. 1-12, 43, 48, 49.
3.	Cates, W. and Grimes, D.A., "Deaths from Second Trimester Abortion by Dilatation and Evacuation: Causes, Prevention, Facilities," *Obstetrics and Gynecology,* 58/4: 401-408, October, 1981, article in record in *Planned Parenthood of Kansas City, Missouri v. Ashcroft,* U.S. S.Ct. No. 81-1255 (Pl. Exh. 2 to Cates Deposition, Df. Exh. 1, Transcript on Remand, offered p. 145, admited pp. 145, 146).
4.	Lebolt, S.A. et al., "Mortality from Abortion and Childbirth: Are the Populations Comparable?" *Journal of the American Medical Association* 248/2: 188-191, July, 1982.

Document # *Documents*

5. Cates, W. et al., "Mortality from Abortion and Childbirth: Are the Statistics Biased?" *Journal of the American Medical Association* 248/2: 192-196, July, 1982.

6. Henshaw, S.K. et al., "Abortion 1977-1979: Need and Services in the United States, Each State and Metropolitan Area," The Alan Guttmacher Institute, New York, 1981; excerpts pp. 1, 3, 4, 5, 23-29, 33, 36, 39.

7. Henshaw, S.K. et al., "Abortion Services in the United States, 1979 and 1980," *Family Planning Perspectives* 14/1: 5-15, January/February, 1982.

8. Cates, W. et al., "Sounding Board: Regulation of Abortion Services—For Better or Worse?" *New England Journal of Medicine* 301: 720-723, September 27, 1979.

9. Grimes, D.A. and Cates, W., "Dilatation and Evacuation," Chapter 10 in Berger, G. et al., *Second Trimester Abortion: Perspectives After a Decade of Experience,* John Wright, P.S.G. Inc., Boston 1981.

10. Grimes, D.A. et al., "Abortion Facilities and the Risk of Death," *Family Planning Perspectives* 13/1: 30-32, January/February, 1981.

11. Tietze, C., *Induced Abortion, A World Review, 1981* 4th Edition, The Population Council, N.Y. 1981; excerpts pp. 83-89.

12. Cates, W., "Late Effects of Induced Abortion; Hypothesis or Knowledge?" *The Journal of Reproductive Medicine* 22/4: 207-212, April, 1979.

13. Chung, C.S. et al., "Induced Abortion and Spontaneous Fetal Loss in Subsequent Pregnancies," *American Journal of Public Health* 72/6: 548-554, June 1982.

Document # *Documents*

14. Alan Guttmacher Institute, *Teenage Pregnancy: The Problem That Hasn't Gone Away*, 1981; excerpts pp. 4, 5, 22-35, 50, 53-55, 57.

15. Cates, W., "Adolescent Abortions in the United States," *Journal of Adolescent Health Care* 1: 18-25, 1980.

16. Adams, M.S. and Neel, J.V., "Children of Incest," *Pediatrics* 40/1:55-62, July, 1967.

17. Lupfer, M. and Silber, B.G., "How Patients View Mandatory Waiting Periods for Abortion," *Family Planning Perspectives* 13/2: 75-79, March/April, 1981.

Document #1

Submitted 6/30/81
First Revision 9/28/81
Second Revision 11/30/81
Published 3/26/82

LEGAL ABORTION AND WOMEN'S HEALTH: GAINS AND LOSSES IN THE 1970s

Willard Cates, Jr., M.D., M.P.H.

Abortion Surveillance Branch
Family Planning Evaluation Division
Center for Health Promotion and Education
Centers for Disease Control

Submitted for publication to
Science

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Centers for Disease Control
Atlanta, Georgia 30333

SUMMARY

The increasing availability and utilization of legal abortion in the United States had several important impacts on public health in the 1970s. It reduced deaths and complications among American women of childbearing age by providing less hazardous alternatives for women who choose to terminate an unwanted pregnancy; it allowed the development of safer surgical procedures for pregnancy termination; and it enhanced low-cost delivery of outpatient gynecologic services. However, legal abortion has been accompanied by developments of some concern--unethical practitioners, potential adverse outcomes in future desired pregnancies, and possibly higher risks of breast cancer in selected women.

KEY WORDS: Abortion, Abortion Morbidity, Abortion Mortality, Public Health, Women's Health

The increasing availability of legal abortion over the past decade has provided the annals of public health in the United States with one of its most rapidly changing chapters. A clandestine procedure before 1970, abortion has been thrust into the medical arena—where procedures can be performed more safely, techniques improved, and costs reduced. After 10 years, we now know more about induced abortion than any other surgical procedure.

Abortion is a controversial topic, and it is essential to use accurate and reliable data in arriving at policy decisions. The statistical data do not directly address society's ethical debate on the issue of abortion. However, the data objectively portray the public health impact for women of childbearing age resulting from the increased availability of legal abortion in the United States over the past decade.

The legalization of abortion has affected many areas of public health: deaths and complications among American women of reproductive age; the development of procedures for pregnancy termination; the delivery of abortion services to women; the costs of both the abortion procedure itself and its resultant complications; the formation of American families; and decision-making about human reproduction. However, the increasing availability of legal abortion has also produced areas of concern: unethical medical practices; potential obstetric sequelae; and possibly higher risks of breast cancer. In the remainder of this article, I will elaborate on these public health issues.

Deaths and Complications Among American Women of Reproductive Age

During the 1960s, abortion was largely illegal in the United States. Because of its criminal nature, no direct count of the annual number of illegal abortions was possible. Rather, estimates of the incidence of illegal

abortion were based on such approaches as local surveys using the randomized response technique (1), extrapolations from deaths and hospitalizations (2) or retrospective projections based on numbers of births and legal abortions (3,4). Because of the imprecision of these approaches, the best estimate of the annual range of induced abortion in the United States in the 1960s was between 200,000 and 1,200,000; the midpoint of this range is 700,000 illegal abortions per year (Figure 1).

These illegally induced abortions caused sizeable numbers of deaths and complications among American women of reproductive age. For example, in 1965, 235 deaths, or 20% of all deaths related to pregnancy and childbirth were attributed to abortion (5). Moreover, in the 1960s, complications from abortion accounted for nearly 20% of pregnancy-related admissions to municipal hospitals in New York and California (5); the average length of stay required to treat these complications was four days (5).

During the 1970s, the United States passed through three stages with regard to the availability of legal abortion: 1) until the middle of 1970, legal abortion was generally not available; 2) from mid-1970 through early 1973, it was available on a limited regional basis; and 3) since 1973, it has been generally available throughout the nation. During this time, the number of reported legal abortions increased from approximately 22,000 in 1969 to over 1.4 million in 1978 (6,7). Initially the increase in legal abortions was accompanied by a progressive decline in the estimated number of illegal abortions (Figure 1). Thus, most of the initial increase in legal abortions was due to a corresponding drop in illegal abortions (3,4,8).

This shift from illegal to legal abortions has had a documented impact on deaths to American women of reproductive age (9). In 1965, even before the

availability of legal abortion, deaths of women from all types of abortion began to decline more rapidly than other causes of death related to pregnancy and childbirth (Figure 2) Several explanations may exist for the decline in abortion-related deaths in the mid-1960s. First, the introduction of more effective contraception led to fewer unwanted pregnancies, which presumably reduced the need for illegal abortions. Between 1965 and 1970, oral contraceptives and intrauterine devices were used by an increasing percentage of married women (10) and this was associated with the decline in unwanted fertility during those years (11). Second, Tietze has speculated that illegal abortions may have shifted from the non-medical to the medical sector and become safer (3).

In 1970 the decline of abortion mortality rapidly accelerated and generally continued through 1976 (Figure 2). This accelerated decline further implies that legal abortions were primarily substitutes for illegal abortions. If abortions had been substituted for term births, then deaths to women from abortion should have increased relative to deaths from other pregnancy-related causes. Instead, the opposite occurred.

Categorization by the Centers for Disease Control (CDC) of all abortion-related deaths into one of three categories--legally induced, illegally induced, or spontaneous--permits an even clearer view of these trends (Figure 3). In 1972, there were 90 abortion-related deaths, while in 1979 there were 29. Through 1976, the highest proportion of this decline occurred in the illegally induced category, where the number of deaths to women decreased from 39 in 1972 to 2 in 1976. The reduction in illegal abortion mortality had a distinct temporal association with the increasing availability of legal abortion.

After 1976, mortality from legally induced abortion declined markedly (Figure 3). During the initial years of CDC's surveillance of abortion-related mortality, the number of deaths after legally induced abortion increased slightly, consistent with the increasing number of women obtaining legal abortions. In 1976, however, the number of deaths from legally induced abortion decreased precipitously and has remained at a lower level through 1979, despite a continuing increase in the number of procedures performed. Thus, the death-to-case rate for legal abortion has declined (Figure 4).

Morbidity trends for abortion in recent years parallel mortality trends. Studies performed at national, state, and local levels show that hospitalization of women with complications resulting from abortion has decreased. Estimates based on the Hospital Discharge Survey from 1970-1977 show a general decline in hospital discharges for women with complications from other-than-legal abortions; the greatest part of this decline occurred in 1973, immediately after the Supreme Court decisions (12). In addition, individual hospitals on both the east and west coasts have shown similar declines (13-19).

These reductions in mortality and morbidity have occurred primarily because legal abortion is safer than any other alternatives available to pregnant women. Once pregnant, a woman is at increased risk of death as the pregnancy progresses, no matter what her choice of outcomes. The acceptability of risks to the woman associated with pregnancy and childbirth may vary depending on whether her pregnancy is wanted.

Besides legal abortion, the two options for a pregnant woman are illegal abortion or carrying the pregnancy to term. Compared to illegally induced

procedures, legally induced abortion is markedly safer. Compared with continuing the pregnancy to term, terminating a pregnancy by legal abortion is associated with lower morbidity (20,21) and mortality (22). For example, between 10%-15% of term births are delivered by cesarean section (23), whereas only 0.07% of first trimester abortion procedures result in intra-abdominal operations (24). Likewise, second trimester abortion methods lead to major surgery in only 0.1% to 0.2% of cases (25). Therefore, the risk of having to undergo major surgery for a complication of a legal abortion is approximately one one-hundredth that of carrying a pregnancy to term. The relative safety of legal abortion is apparent.

Moreover, the rates of severe psychiatric sequelae and death are lower for women who obtain legal abortion compared to those who continue their pregnancies. The risk of severe emotional problems is higher with a live birth following a normal pregnancy than with a legal abortion (26,27). Regarding mortality measures, the risk of dying from induced abortion during the first 15 weeks of pregnancy is one-seventh the risk of dying from pregnancy and childbirth (Figure 5), even after standardizing the population groups for differences in age and race (22).

The increased risk to the woman of continuing rather than terminating her pregnancy may be further exaggerated when the pregnancy is unwanted. Women with negative attitudes toward their pregnancies have higher postpartum infection and hemorrhage rates than women with more favorable attitudes (21). Possible mechanisms for these poorer obstetric outcomes associated with unwanted pregnancies include a direct stress-mediated influence on catecholamines (28), less concern by the woman for proper pre-natal care or differences in clinical management of labor and delivery (21).

Development of Abortion Techniques and Expertise

The increased availability of legal abortion in the United States since 1970 has influenced both the safety of abortion methods and the skill of the clinicians performing abortions. The six-fold increase in the number of abortion procedures over a relatively short interval has led to rapid development of technology (29). The most influential change has been the widespread adoption of the vacuum aspiration technique (suction curettage) to evacuate the uterus (30) which replaced the traditional scraping technique (sharp curettage) as the primary means of terminating pregnancies. In 1970, the proportions of procedures performed by suction and sharp curettage were similar--54% were performed by suction and 46% by sharp (24). Over the next nine years, the percentage of suction curettage procedures gradually increased. By 1978 suction curettage accounted for 90% of all curettage procedures. Of those curettage methods used at 12 weeks or earlier, 96% were performed by suction (6).

Another improvement has been the recognition that curettage techniques can terminate pregnancies at 13 weeks' gestation or later more safely than the other alternative methods (31); thus, delaying an abortion through the 13 to 16 week interval, required for the instillation of abortifacients into the uterus, is not appropriate. Before legal abortion was available, performing curettage on a pregnant uterus after 12 weeks was thought to be too dangerous. Once abortion became legal, however, comparative studies could be undertaken to determine the safest methods of terminating pregnancy after 12 weeks. Through these studies, we have learned that curettage techniques, especially through 16 weeks' gestation, are safer than instillation procedures

(31,32). As a result, curettage has become the preferred procedure to terminate these later pregnancies over recent years (32).

The legalization of abortion has allowed clinicians the opportunity both to learn different surgical techniques and to manage the immediate complications associated with these techniques. Before the availability of legal abortion, very few pregnancy termination procedures were taught in routine obstetric and gynecologic training programs (33). The only experience with uterine evacuation for residents in training usually came either when performing sharp curettage on a non-pregnant uterus for diagnostic purposes or when removing residual uterine tissue after a routine miscarriage. These procedures are different from those involved in evacuating a pregnant uterus.

The increase in physician training and experience may be one factor (33,34) contributing to the decrease in deaths related to legally induced abortion after 1975 (Figure 4). The death-to-case rate for legal abortion has decreased from 6.2 per 100,000 procedures in 1970 to 0.6 in 1978 (6). Improvements in anesthesia technique, use of more appropriate methods of dilatation, reductions in the percentage of major operative procedures for abortion (i.e., hysterotomy or hysterectomy), greater willingness to re-evacuate a uterus in cases of suspected retained tissue, and physician familiarity with other abortion complications all may have played a role.

Delivery of Abortion Services

The increasing availability of and requests for abortion services have also led to two changes in when and where they are delivered: first, women obtaining legally induced abortions are doing so at progressively earlier gestational ages (6); second, most abortions are now being performed in non-hospital facilities, the so-called "freestanding clinics" (7). These two

factors concurrently influence the safety, convenience, and cost of abortion procedures.

In 1970, nearly one out of every four abortions was performed at gestations of 13 weeks or later. By 1978, less than one in ten abortions was performed later than 13 weeks (6). Moreover, even within the first 12 weeks, there has been a shift toward obtaining procedures earlier in gestation: in 1978, over half of all women having abortions terminated their pregnancies before 8 weeks' gestation (6). Because gestational age is an important factor and affects the risk of complications after legally induced abortion (20), the trend toward obtaining abortions earlier in gestation has contributed to reducing the number of deaths and complications from this procedure.

Before the legalization of abortion, the term "in-hospital" was generally used to describe legal abortion procedures (35). In 1970, women were frequently hospitalized for at least two days in order to have a legally induced abortion: the first night was for preoperative evaluation, while the second night was for postoperative recovery (36). Even in 1973, over 60% of all abortions were performed in hospitals. However, during the past 6 years, the situation reversed itself (7). By 1979, over 70% of abortion procedures were performed in freestanding clinics, without any hospitalization; about half of those performed in hospitals were on an outpatient basis (7).

Costs of Medical Care

The increasing availability of legal abortion has affected its cost. Before 1969, if it could be obtained, therapeutic abortion frequently cost over $500 (37). For this reason, women of higher socioeconomic levels were more likely to obtain therapeutic abortions (35). Today, uterine evacuation procedures performed in clinics are usually no more than $150 (38).

The developments in abortion technology and the increasing use of freestanding clinics have further reduced costs. For example, curettage procedures to terminate pregnancies of more than 12 weeks' gestation cost approximately one-half that for instillation procedures. Also, use of non-hospital facilities obviates the hospital charges that have played a major role in increasing the cost of medical care in the United States. The average room charge for one day in a hospital is more than the cost of a suction curettage procedure in a freestanding clinic (38).

The increasing availability of legal abortion procedures has also reduced the cost to society of treating abortion complications. The substitution of legal for illegal abortion led to an estimated saving of $30 per aborting woman in public expenditures for treating infected and/or incomplete abortions (39). The improved safety of legal abortion techniques has also decreased abortion complications and resulting costs. Assuming a national decrease in morbidity similar to that in mortality, the 75% reduction in complications would save approximately $20 million annually (40).

Formation of American Families

Marriage and childbearing patterns have been measurably influenced by legal abortion; so has the formation of American families. In the United States before 1969, trends in marriage rates among states with different levels of legal abortion services were similar (41). Beginning in 1970, states with high legal abortion-live birth ratios began exhibiting significant declines in marriage rates, especially among teenage women, not experienced by states with lower legal abortion ratios (41). Liberalized abortion policies apparently provided many teenagers with a new alternative to high-risk marriages precipitated by a premarital pregnancy. These marriages are less stable than those of their contemporaries who postpone childbearing (42).

Legalization of abortion has been temporally associated with a decline in out-of-wedlock birth rates in New York City (43), California (44), Oregon (45), and the United States as a whole (46). Since most teenage out-of-wedlock births were unwanted (42), and since more than 85% of abortions performed on teenagers have been obtained by unmarried women, some increase in the number of abortions among teenagers probably affected unintended fertility. States with the highest teenage and overall childbearing rates had the lowest abortion-to-live-birth ratios (47,48).

For American families at known risk of genetic anomalies, the availability of amniocentesis and selective abortion has allowed couples either to undertake pregnancies they might never have considered or else to continue pregnancies that they would have terminated. If the option of legal abortion were not possible, 10% of women in Buffalo undergoing amniocentesis would not otherwise have initiated or continued their pregnancies (49). A national survey of genetic centers (50) identified 67 women who terminated their pregnancies specifically because prenatal diagnosis was not available; most of these women were at low risk (under 2%) of having a defective child, thus they would have continued their pregnancies if provided the reassurance of prenatal diagnosis.

Decision Making About Reproduction

As American consumers have increasingly demanded more information about health services, many family planning providers have developed elaborate counseling protocols to aid women with unwanted pregnancies in making responsible decisions (38,51). A random survey of abortion providers in 1976 showed 98% of clinics and 60% of hospitals reported offering pregnancy counseling services (38); 100% of clinics and 60% of hospitals provided

contraceptive counseling. Based on in-depth interviews, most women considering pregnancy termination claim not to take their decision lightly (51-53). Many have already made responsible decisions about their reproductive behavior before becoming pregnant (53). Others, especially teenagers without benefit of rudimentary sexual knowledge, find the situation of an unwanted pregnancy the first important decision point in their lives (51).

The increasing utilization of legal abortion is associated with an increasing proportion of women using contraception even after adjusting for sexual activity. Four different methodologic approaches have supported this inference. First, longitudinal studies documented an increase in the percentage of women using contraception immediately after an abortion compared with before the pregnancy; these women continued to use effective contraception methods at least 6 months afterwards (54,55).

Second, national studies of reproductive behavior conducted between 1965 and 1975 demonstrated an increasing percentage of married women using contraception even as legal abortion was becoming more widely available (56). Moreover, the largest incremental annual increases, 3% per year, occurred between 1973 and 1975.

Third, the national patterns of increasing sexual activity (57) and declining birth rates (58) indicate that women are becoming increasingly able to control their fertility through either contraceptive practice or abortion. The proportion of never-married teenagers having unprotected intercourse decreased by one-half between 1971 and 1979 (57). Moreover, in 1976, young unmarried women who became pregnant unintentionally and had an abortion were probably more likely to be using contraception before their abortion than women who did not have an abortion (59).

Fourth, between 1960 and 1974, the national conception rates actually decreased, if allowances are made for the number of illegal abortions performed in earlier years (60). In New York City, the conception rate also declined during the initial three years legal abortion was available (61).

Unethical Medical Practices

Because of the relatively low fees for abortion procedures, abortion providers would have to perform a large number of legal abortions to enhance profit. These competitive pressures lead some facilities and clinicians to use practices considered unethical by many (62). While the magnitude of these unethical practices is not precisely known, the relatively low overall rates of morbidity and mortality after legal abortion would indicate they are not widespread.

Investigations in four cities (Detroit, Los Angeles, Chicago, and New York) have documented occasional questionable medical practices such as 1) misleading "pregnancy counseling" agencies which use high-pressure tactics and false information to refer women to a subsidiary abortion facility; 2) "abortion" procedures deliberately performed on non-pregnant women without their informed consent; 3) operations performed by unlicensed personnel--either non-physicians masquerading as physicians or physicians who have previously lost their license to practice; and 4) facilities which are deliberately operated without state licenses and whose personnel knowingly falsify required medical records.

Besides the unethical practices, some physicians have deliberately performed dangerous abortion procedures. One practitioner allegedly performed intentional incomplete abortions which would require a second procedure; thus, he could bill for two separate operations (63). This practice not only

involved fraudulent billing, but also put women at higher risk of morbidity and mortality; one woman eventually died from infection resulting from retained products of conception. Another physician performed vaginal hysterotomy procedures in his private office (64). He was not equipped to handle the operative emergencies which occurred. Two women died from these procedures. Both physicians were found guilty of criminal offenses.

In other situations, use of outdated or unproven methods by some clinicians have led to sporadic clusters of deaths and complications (65,66). For example, intrauterine placement of a "super coil" to terminate second trimester pregnancies led to unacceptably high complication rates (65). While this specific procedure has been abandoned, deaths still occur from use of indwelling foreign bodies by licensed physicians (67).

Finally, in at least two instances, abortion providers have admitted charging one fee for women funding their abortions through private sources and a second fee, two to three times higher, for women using public funding sources (68). Although the offenders claim these billing practices are necessary to underwrite the paperwork required for, and the delay inherent in, government third-party payments, the magnitude of these differences is hardly justifiable.

These unethical practices have been attacked by both abortion providers and those opposed to abortion. Most responsible abortion providers are concerned that the questionable medical practices will both endanger women's health and taint the safety record of legal abortion; as such, they have cooperated with investigative organizations to identify the problem practitioners (69) and have developed model standards to improve their already relatively safe procedure (62). Groups opposed to abortion have highlighted

the isolated events as representative of the poor medical care delivered by abortion providers and have used them as a basis to regulate all abortion services (70).

Future Childbearing

Recent headlines have reported that women with prior induced abortions, especially previous multiple abortions, have an increased risk of adverse events in future desired pregnancies. These preliminary reports have led some to predict an epidemic of miscarriages, prematurity, and low-birth-weight infants in the future (71).

Unfortunately, the best available data addressing this issue do not permit a precise estimate of such risks, if any (72-75). The recent scientific literature from the United States is inconsistent about whether one abortion, or even multiple abortions, were associated with increased rates of adverse reproductive outcomes in subsequent desired pregnancies. Of the 8 studies currently published, two (76,77) have demonstrated a significant association of a single induced abortion on subsequent childbearing; the others (78-83) have found either no association or such a small level of risk that chance could have accounted for the difference. Two published studies (82,83) have implicated multiple induced abortions as factors leading to 3-fold higher risks of miscarriage, but one preliminary report from Hawaii (84) could not confirm this finding.

Several studies outside the United States (85-87) have demonstrated significant associations implicating a particular abortion procedure, especially the practice of sharp curettage. Since variations in abortion methods produce different short-term complications, they might also be expected to have different effects on long-term obstetric sequelae. For

example, traditional sharp curettage frequently involves wider dilatation than current suction procedures (27). If the manner and/or width of dilatation, rather than the number or method of evacuation procedures, influence future pregnancies, use of laminaria for preoperative cervical dilatation might reduce risks (83).

Differences among the characteristics of women studied also produce conflicting results (75). For example, parity has an important effect on pregnancy outcome (88), with first births being at higher risk of preterm delivery than subsequent births. Thus, investigations which compare first births of women with a previous abortion to second births of women with a previous term birth will tend to find more complications among the abortion group, spuriously due to differences in parity (75).

Breast Cancer

Whether induced abortion is associated with subsequent development of breast cancer is another area of increasing concern (89). Previous international investigations have shown that a woman is at lower risk of developing breast cancer if she gives birth at a young age (90). However, only full-term pregnancies afford this protection. If the first pregnancy terminates within 4 months' gestation, a woman appears to have an increased risk of breast cancer (91-95). Unfortunately, these earlier studies did not differentiate between induced and spontaneous abortion.

A recent investigation in Los Angeles (89) found breast cancer in young women was over 2-fold higher if they had experienced either an induced or a spontaneous abortion. Two specific conditions were necessary: 1) the abortion has to occur before 3 months' gestation; and 2) the woman had to be nulliparous at the time of the abortion. A biologic explanation for a

possible positive association between early abortion and breast cancer, and a negative association between early age at first childbearing and breast cancer, might involve variations in breast tissue during different intervals of pregnancy (96). Early in pregnancy, rapid proliferation of breast tissue might render more cells susceptible to neoplastic stimuli (tumor initiation), or might hasten the growth of malignant cells (tumor promotion). The protective effect of continuing a pregnancy to term could involve either breast cell differentiation later in pregnancy, and/or a permanently altered estrogen profile during the later stages of gestation (97).

While data from this investigation are consistent with earlier findings, the case-control designs raise questions of ascertainment bias. Specifically, could women with breast cancer be more likely to remember and/or admit previous abortions than a comparison group? Also, women in the Los Angeles study had their cancers diagnosed prior to age 32 (89). The incidence of breast cancer in this age group is very low, about 20 per 100,000 women (96). Whether any association between abortion and breast cancer occurs later in life has not been documented. If that association is not found, then the public health impact of abortion on breast cancer incidence, if any, would be very small. Further investigations may cast light on these important questions.

Conclusion

To summarize, the increasing availability and utilization of legal abortion in the United States has had an important public health impact in the 1970s. Like any social phenomenon, the issue of legal abortion has its advantages and disadvantages. Accurate and reliable information will help policy makers, practitioners and American women make more rational decisions

on abortion. The data clearly indicate the legalization of abortion has been accompanied by a decline in deaths and complications among American women of childbearing age by providing a safer alternative for women faced with unwanted pregnancies. It also led to the rapid development of technological advances and clinical expertise in pregnancy termination procedures. It stimulated development of more convenient, low-cost outpatient health services. However, legal abortion has also brough with it areas of concern--unethical practitioners, potential adverse outcomes of future desired pregnancies and possibly higher risks of breast cancer in selected women.

The author thanks the following individuals for their helpful suggestions and constructive input to this manuscript: David A. Grimes, Christopher Tietze, Carol L.R. Hogue, Roger W. Rochat, Carl W. Tyler, Horace G. Ogden, Dennis Tolsma, Jennifer L. Kelsey, Sally Faith Dorfman, Laura Leathers, and Martha Mayfield.

REFERENCES

1. Abernathy JR, Greenberg BG, Horvitz DG. Estimates of induced abortion in urban North Carolina. Demography 1970;7:19-29.
2. Calderone MS. Abortion in the United States. New York: PB Hoeber, 1958.
3. Tietze C. Two years' experience with a liberal abortion law: its impact on fertility trends in New York City. Fam Plann Perspect 1973;5:36-41.
4. Tietze C, Bongaarts J. The demographic effect of induced abortion. Obstet Gynecol Survey 1976;31:699-709.
5. Moore-Cavar EC. International Inventory of Information on Induced Abortion. New York: International Institute for the Study of Reproduction, Columbia University, 1974:520,593-5,603-6,642.
6. Centers for Disease Control. Abortion Surveillance, 1978. Issued November 1980.
7. Henshaw S, Forrest JD, Sullivan E, Tietze C. Abortion in the United States, 1978-1979. Fam Plann Perspect 1981;13:6-18.
8. Cates W Jr, Rochat RW. Illegal abortion in the United States, 1972-1974. Fam Plann Perspect 1976;8:86-92.
9. Cates W Jr, Rochat RW, Grimes DA, Tyler CW Jr. Legalized abortion: effect on national trends of maternal and abortion-related mortality (1940-1976). Am J Obstet Gynecol 1978;132:211-4.
10. Westoff CF. The modernization of United States contraceptive practice. Fam Plann Perspect 1972;4:9-12.

11. Ryder NB, Westoff CF. Wanted and unwanted fertility in the United States: 1965 and 1970. In: Westoff CF, Parker R Jr, eds. Commission on Population Growth and the American Future. Washington, D.C.: U.S. Government Printing Office, 1972:471-82.

12. Bracken MB, Freeman DH, Hellenbrand K. Hospitalization for legal induced and other abortions in the United States 1970-1977. Am J Public Health (in press).

13. Goldstein P, Stewart G. Trends in therapeutic abortion in San Francisco. Am J Public Health 1972;62:695-9.

14. Landman JT, Kohl SG, Bedel JH. Changes in pregnancy outcome after liberalization of the New York State abortion law. Am J Obstet Gynecol 1974;118:485-92.

15. Kahan RS, Baker LD, Freeman HG. The effect of legalized abortion on morbidity resulting from criminal abortion. Am J Obstet Gynecol 1975;121:114-6.

16. Stewart GK, Goldstein PJ. Therapeutic abortion in California: effects on septic abortion and maternal mortality. Obstet Gynecol 1971;37:510-4.

17. Glass L, Evans HE, Swartz DP, Rajegowda BK, Leblanc W. Effects of legalized abortion on neonatal mortality and obstetrical morbidity at Harlem Hospital Center. Am J Public Health 1974;64:717-8.

18. Seward PN, Ballard CA, Ulene AL. The effect of legal abortion on the rate of septic abortion at a large county hospital. Am J Obstet Gynecol 1973;115,335-8.

19. The Alan Guttmacher Institute. Safe and legal: 10 years' experience with legal abortion in New York State. New York: The Alan Guttmacher Institute, 1980:23.17.

20. Cates W Jr, Schulz KF, Grimes DA, Tyler CW Jr. The effect of delay and choice of method on the risk of abortion morbidity. Fam Plann Perspect 1977;9:266-73.

21. Laukaran VH, Van Den Berg BJ. The relationship of maternal attitude to pregnancy outcomes and obstetric complications. Am J Obstet Gynecol 1980;136:374-9.

22. Cates W Jr, Tietze C. Standardized mortality rates associated with legal abortion: United States, 1972-1975. Fam Plann Perspect 1978;10:109-12.

23. Bottoms SF, Rosen MG, Sokol RJ. The increase in the cesarean birth rate. N Engl J Med 1980;302:559-63.

24. Cates W Jr, Schulz KF, Grimes DA, Tyler CW Jr. Short-term complications of uterine evacuation techniques for abortion at 12 weeks' gestation or earlier. In: Zatuchni GI, Sciarra JJ, Speidel JJ, eds. Pregnancy termination: procedures, safety and new developments. Hagerstown, Maryland: Harper and Row, 1979:127-35.

25. King TM, Atienza MF, Burkman RT. The incidence of abdominal surgical procedures in a population undergoing abortion. Am J Obstet Gynecol 1980;137:530-3.

26. Athanasiou R, Oppel W, Michelson L, Unger T, Yager H. Psychiatric sequelae to term birth and induced early and late abortion: a longitudinal study. Fam Plann Perspect 1973;5:227-31.

27. Brewer C. Incidence of post-abortion psychosis: a prospective study. Br Med J 1977;1:476-7.

28. Lederman E, Lederman RP, Work BA, McCann DS. Maternal psychological and physiologic correlates of fetal-newborn health status. Am J Obstet Gynecol 1981;139:956-8.

29. Stubblefield PG. Current technology for abortion. Current Problems in Obstetrics and Gynecology 1978;2(4):3-44.

30. Kerslake C, Casey D. Abortion induced by means of the uterine aspirator. Obstet Gynecol 1967;30:35-45.

31. Grimes DA, Schulz KF, Cates W Jr, Tyler CW Jr. Midtrimester abortion by dilatation and evacuation: a safe and practical alternative. N Engl J Med 1977;296:1141-5.

32. Grimes DA, Cates W Jr. Dilatation and evacuation. In: Berger GS, Brenner WE, Keith L, eds. Second trimester abortion: perspectives after a decade of experience. Littleton, Massachusetts: PSG Publishing Company 1981;119-34.

33. Burkman RT, King TM, Burnett LS, Atienza MF. University abortion programs: one year later. Am J Obstet Gynecol 1974;119:131-6.

34. Andolsek L, Oven M. The operation and the operator. In: Andolsek L, ed. The Ljubljana Abortion Study 1971-1973. Ljubljana, Yugoslavia: National Institutes of Health, 1974:12-4.

35. Erhardt CL, Tietze C, Nelson FG. United States: therapeutic abortions in New York City. Stud Fam Plann 1970;51:8-9.

36. Tietze C, Lewit S. Joint Program for the Study of Abortion (JPSA): early medical complications of legal abortion. Stud Fam Plann 1972;3:98-122.

37. Overstreet EW. Logistic problems of legal abortion. Am J Public Health 1971;61:496-9.

38. Lindheim BL. Services, policies and costs in U.S. abortion facilities. Fam Plann Perspect 1979;11:283-9.

39. Robinson M, Pakter J, Svigir M. Medicaid coverage of abortions in New York City: costs and benefits. Fam Plann Perspect 1974;6:202.

40. Von Allmen SD, Cates W Jr, Schulz KF, Grimes DA, Tyler CW Jr. Costs of treating abortion-related complications. Fam Plann Perspect 1977;9:273-6.

41. Bauman KE, Anderson AE, Freeman JL, Koch GG. Legal abortions and trends in age-specific marriage rates. Am J Public Health 1977;67:52-3.

42. Trussell J, Menken J. Early childbearing and subsequent fertility. Fam Plann Perspect 1978;10:209-18.

43. Pakter J, O'Hare D, Nelson F, Svigir M. Two years' experience in New York City with the liberalized abortion law - progress and problems. Am J Public Health 1973;63:524-35.

44. Sklar J, Berkov B. The effects of legal abortion on legitimate and illegitimate birth rates: the California experience. Stud Fam Plann 1973;4:381-92.

45. Quick JD. Liberalized abortion in Oregon: effects on fertility, prematurity, fetal death, and infant death. Am J Public Health 1978;68:1003-8.

46. Sklar J, Berkov B. Abortion illegitimacy and the American birth rate. Science 1974;185:909-15.

47. Bauman KE, Anderson AE, Freeman JL, Koch GG. Legal abortions, subsidized family planning services, and the U.S. "Birth Dearth". Soc Biol 1977;24:183-91.

48. Brann EA. A multivariate analysis of interstate variation in fertility of teenage girls. Am J Public Health 1979;69:661-6.

49. Bernhardt B, Bannerman RM. The pro-life bonus of amniocentesis. N Engl J Med 1980;302:925.

50. Hook EB, Willey AM. Abortions because of unavailability of prenatal diagnosis. Lancet 1981;2:936.

51. Bracken MB. Psychosomatic aspects of abortion: implications for counseling. J Reprod Med 1977;19:265-72.

52. Freeman EW. Abortion: subjective attitudes and feelings. Fam Plann Perspect 1978;10:150-5.

53. Luker K. Taking chances: abortion and the decision not to contracept. Berkeley, California: University of California Press, 1975.

54. Margolis A, Rindfuss R, Coghlan P, Rochat RW. Contraception after abortion. Fam Plann Perspect 1974;6:56-60.

55. Miller E, McFarland V, Burnhill MS, Armstead JW. Impact of the abortion experience on contraceptive acceptance. Adv Plann Parent 1977;12:15-28.

56. Tietze C. Abortion and contraception. Fam Plann Perspect 1977;9:297.

57. Zelnik M, Kantner JF. Sexual activity, contraceptive use and pregnancy among metropolitan-area teenagers: 1971-1979. Fam Plann Perspect 1980;12:230-7.

58. National Center for Health Statistics. Final natality statistics - 1978. Monthly Vital Statistics Report.

59. Zelnik M, Kantner JF. Contraceptive patterns in premarital pregnancy among women aged 15-19 in 1976. Fam Plann Perspect 1978;10:135-42.

60. Baldwin WH. Adolescent pregnancy and childbearing - growing concerns for Americans. Population Bulletin 1976;31:16-7.

61. Tietze C. Contraceptive practice in the context of nonrestrictive abortion law: Age-specific pregnancy rates in New York City, 1971-1973. Fam Plann Perspect 1975;7:197-202.

62. National Abortion Federation. Standards. New York, New York: National Abortion Federation, 1980:10.

63. Kiernan LA. Sherman indicted for a murder in death of abortion patient. Washington Post, April 26, 1978:2.

64. Stroh G, Katz SH, Hinman AR. Performing second-trimester abortions: Rationale for inpatient basis. NY State J Med 1975;75:2168-71.

65. Berger GS, Bourne JP, Tyler CW Jr, et al. Termination of pregnancy by "super coils" morbidity associated with a new method of second-trimester abortion. Am J Obstet Gynecol 1973;116:297-304.

66. Berger GS, Gibson JJ, Harvey RP, Tyler CW Jr, Pakter J. One death and a cluster of febrile complications related to saline abortions. Obstet Gynecol 1973;41:121-6.

67. Grimes DA, Cates W Jr, Tyler CW Jr. Death after legal abortion by catheter placement. Am J Obstet Gynecol 1977;129:107-8.

68. Knudson M. Abortion clinics' prices held higher for insurer. Baltimore Sun, July 15, 1980:C1, C3.

69. Zekman P, Warrick P. The Abortion Profiteers. Chicago: Chicago Sun-Times; 1978.

70. Cates W Jr, Gold J, Selik RM. Regulation of abortion services: for better or worse? N Engl J Med 1979;301:720-3.

71. Calvert D. Premature births and low birth weight babies in pregnancies following an induced abortion. Washington, D.C.: Christian Action Council (undated, unnumbered publication).

72. Hogue CJR. Review of postulated fertility complications subsequent to pregnancy termination. In: Sciarra JJ, Zatuchni GI, Speidel JJ, eds. Risks, benefits, and controversies in fertility control. Hagerstown, Maryland: Harper and Row, 1978:356-67.

73. Bracken MB. Induced abortion as a risk factor for perinatal complications: a review. Yale J Biol Med 1978;51:539-48.

74. Cates W Jr. Late effects of induced abortion: Hypothesis or knowledge? J Reprod Med 1979;22:207-22.

75. Tietze C. Induced abortion: A World Review. New York: The Population Council, 1981.

76. Berkowitz GS. An epidemiologic study of preterm delivery. Am J Epidemiol 1981;113:81-92.

77. Madore C, Hawes WE, Many F, Hexter AC. A study on the effects of induced abortion on subsequent pregnancy outcome. Am J Obstet Gynecol 1981;139:516-21.

78. Daling JR, Emanuel I. Induced abortion and subsequent outcome of pregnancy in a series of American women. N Engl J Med 1977;297:1241-5.

79. Kline J, Stein Z, Susser M, Warburton D. Induced abortion and spontaneous abortion: No connection? Am J Epidemiol 1978;107:290-8.

80. Bracken MB, Holford TR. Induced abortion and congenital malformations in offspring of subsequent pregnancies. Am J Epidemiol 1979;109:425-532.

81. Schoenbaum SC, Monson RR, Stubblefield PG, Darney PD, Ryan KJ. Outcome of the delivery following an induced or spontaneous abortion. Am J Obstet Gynecol 1980;136:19-24.

82. Levin AA, Schoenbaum SC, Monson RR, Stubblefield PG, Ryan KJ. Association of induced abortion with subsequent pregnancy loss. JAMA 1980;243:2495-99.

83. Harlap S, Shiono P, Ramcharan S, Berendes H, Pellegrin F. A prospective study of spontaneous fetal losses after induced abortions. N Engl J Med 1979;301:677-81.

84. Chung CS, Steinhoff PG, Ming-Pi M, Smith RG. Induced abortion and risk of subsequent spontaneous abortion and ectopic pregnancy. Presented at the 108th Annual Meeting of the American Public Health Association, Detroit, MI, 1980 October 21.

85. World Health Organization Task Force on the Sequelae of Abortion: Gestation, birthweight, and spontaneous abortion in pregnancy after induced abortion. Lancet 1979;1:142-5.

86. Slater PE, Davies AM, Harlap S. The effect of method of abortion on the outcome of subsequent pregnancy. J Reprod Med 1981;26:123-8.

87. Obel E. Pregnancy complications following legally induced abortion with special reference to abortion technique. Acta Obstet Gynecol Scand 1979a;58:147-52.

88. Lee K, Tseng P, Eidelman AI, Kandall SR, Gartner LM. Determinants of neonatal mortality. Am J Dis Child 1976;130:842-6.

89. Pike MC, Henderson BE, Casagrande JT, Rosario I, Gray GE. Oral contraceptive use and early abortion as risk factors for breast cancer in young women. Br J Cancer 1981;43:72-6.

90. MacMahon B, Cole P, Lin TM, et al. Age at first birth and breast cancer risk. Bull Wld Hlth Org 1970;43:209-21.

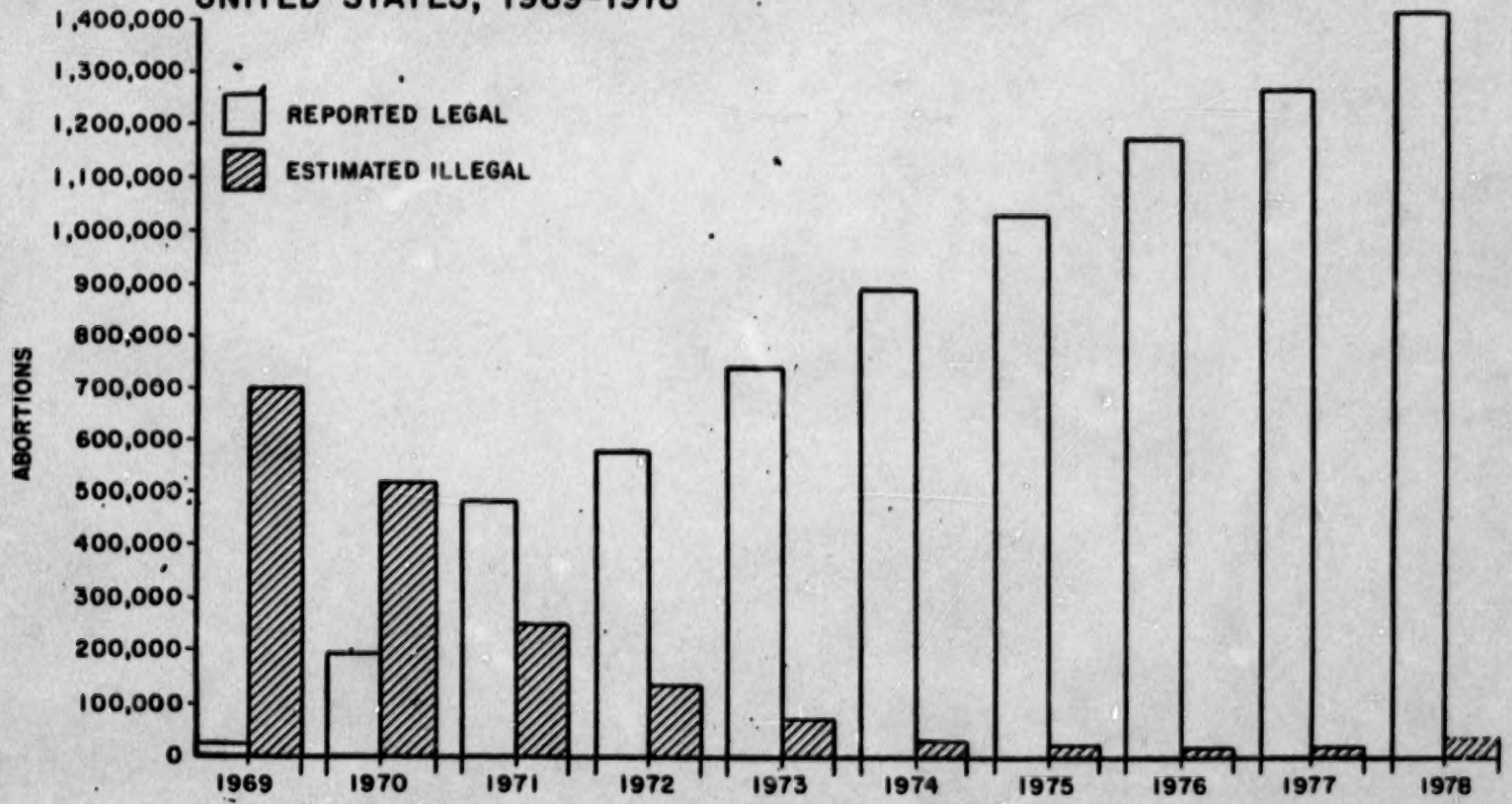
91. Valaoras VG, MacMahon B, Trichopoulos B, et al. Lactation and reproductive histories of breast cancer patients in Greater Athens, 1965-67. Int J Cancer 1969;4:350-3.

92. Ravnihar B, MacMahon B, Lindtner J. Epidemiologic features of breast cancer in Slovenia, 1965-67. Eur J Cancer 1971;7:295-306.

93. Yuasa S, MacMahon B. Lactation and reproductive histories of breast cancer patients in Tokyo, Japan. Bull Wld Hlth Org 1970;42:192-204.

94. Lin TM, Chen KP, MacMahon B. Epidemiologic characteristics of cancer of the breast in Taiwan. Cancer 1971;27:1497-1504.

Fig. 1 RELATIONSHIP BETWEEN LEGAL AND ILLEGAL ABORTION, UNITED STATES, 1969-1978



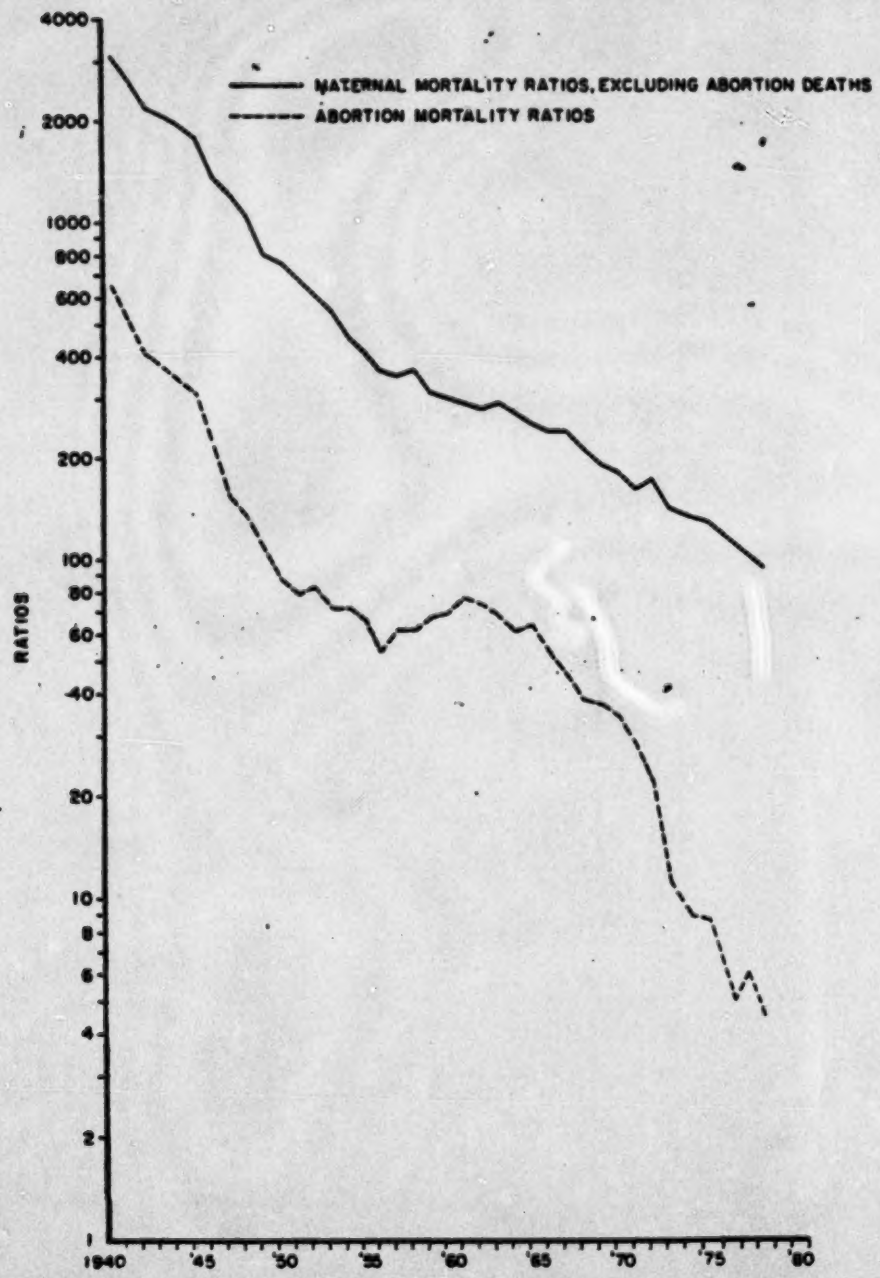
Sources: Illegal abortion - extrapolation from references 1-4
Legal abortion - references 6 and 7

95. Choi NW, How GR, Miller AB, et al. An epidemiologic study of breast cancer. Am J Epidemiol 1978;107:510-21.

96. Kelsey JL. A review of the epidemiology of human breast cancer. Epidemiol Rev 1979;1:74-109.

97. Cole P, MacMahon B. Oestrogen fractions during early reproductive life in the aetiology of breast cancer. Lancet 1969;1:604-6.

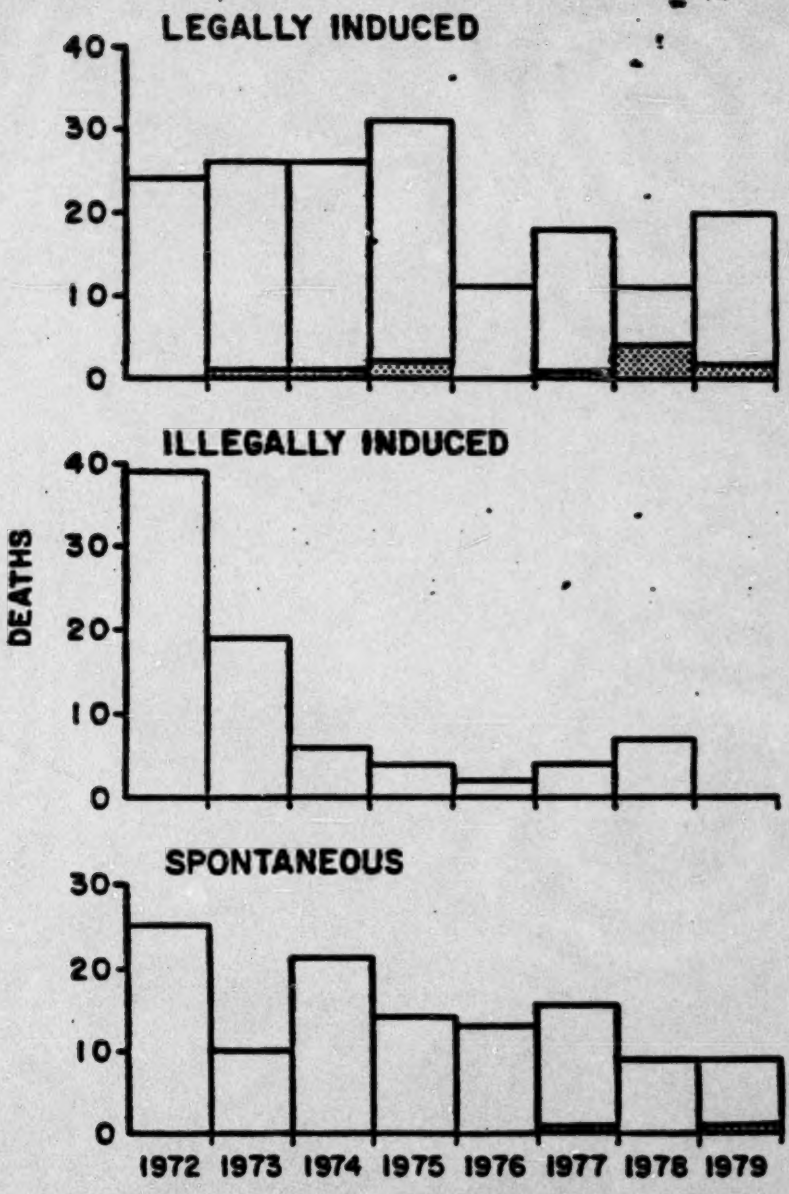
Fig. 2 MATERNAL MORTALITY RATIOS (EXCLUDING ABORTION DEATHS)[1,2] AND ABORTION MORTALITY RATIOS[2], UNITED STATES, 1940-1978[3]



[1]Maternal mortality ratio (excluding abortion deaths) equals total maternal deaths minus abortion deaths per 1,000,000 live births
[2]Abortion mortality ratio equals total abortion deaths per 1,000,000 live births

Source: National Center for Health Statistics. U.S. Vital Statistics, 1940-1978.

Fig. 3 ABORTION-RELATED DEATHS BY CATEGORY* AND YEAR,** UNITED STATES, 1972-1979



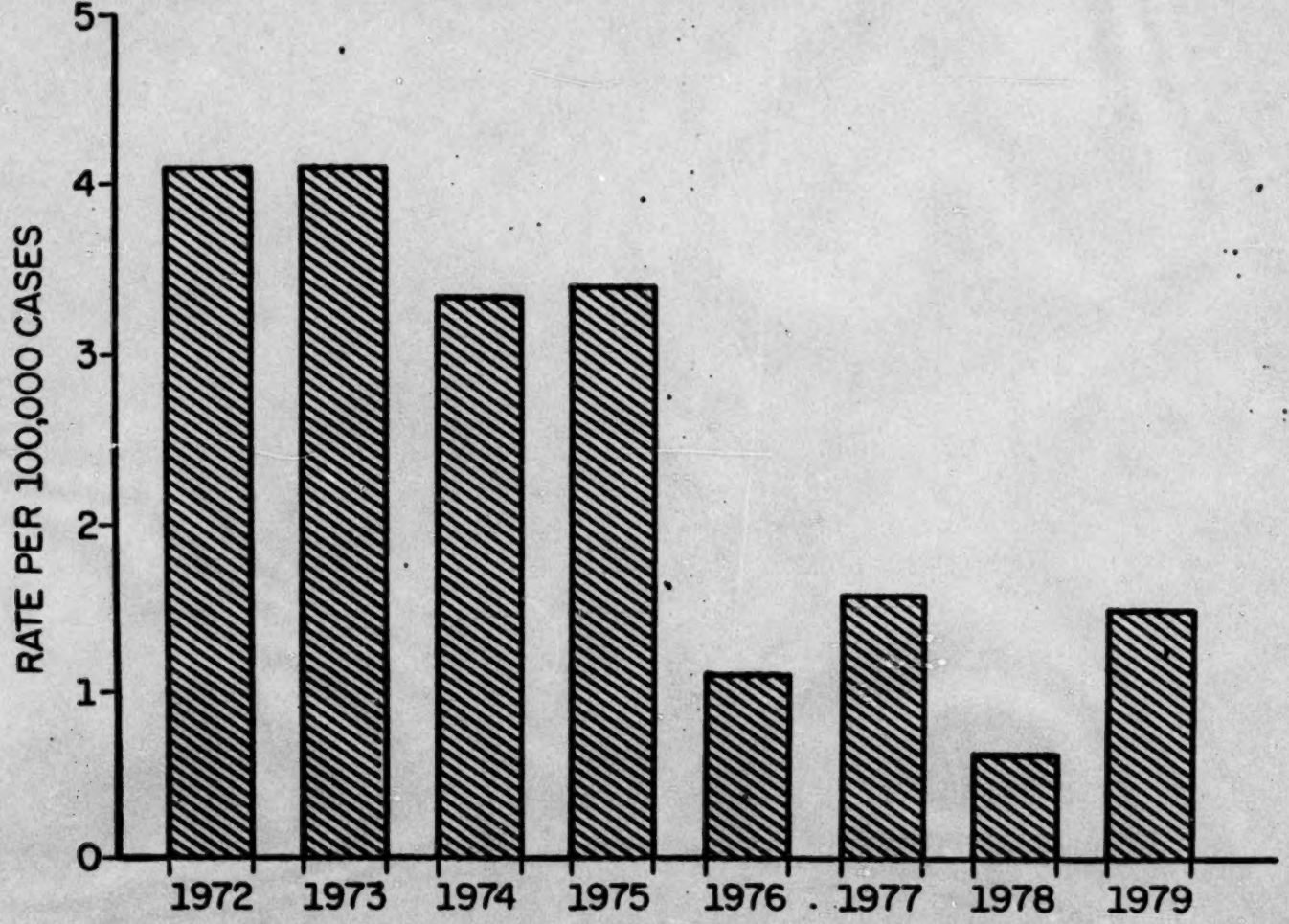
*EXCLUDES UNKNOWN CATEGORY
**1979 DATA ARE PROVISIONAL

ECTOPIC PREGNANCY

Source: Centers for Disease Control. MMWR Annual Summary, 1980.

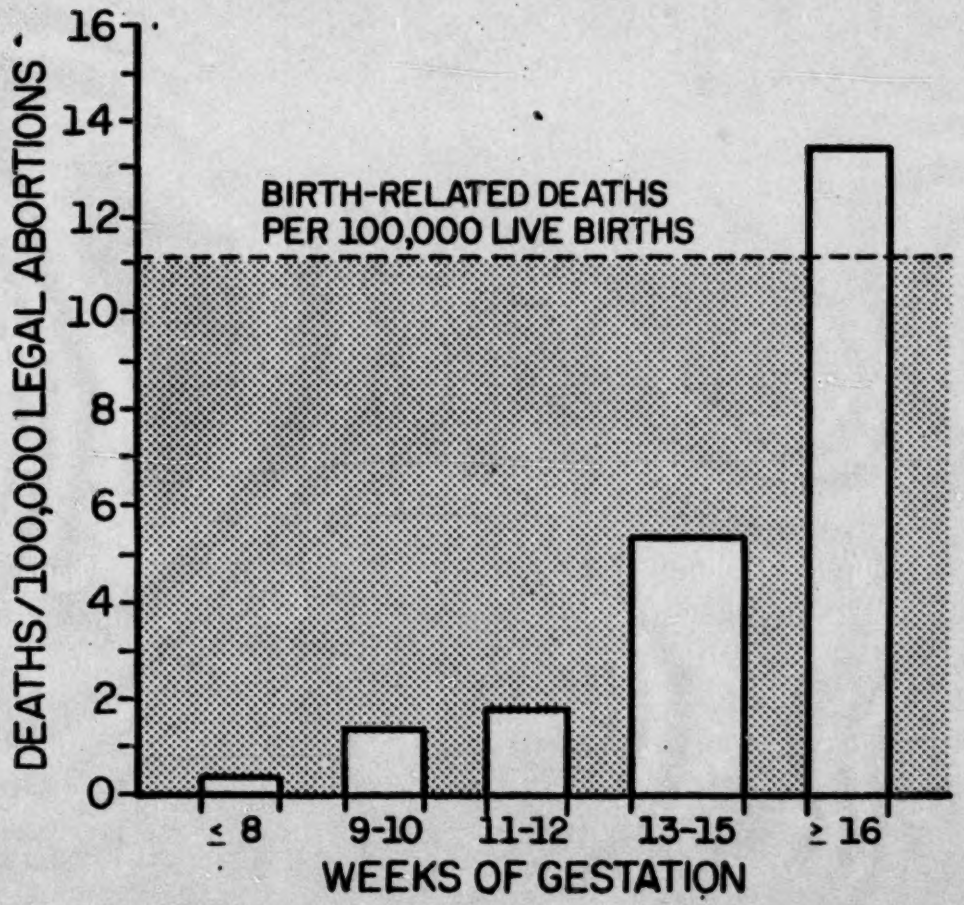
Fig. 4

DEATH-TO-CASE RATES FOR LEGAL ABORTION, UNITED STATES, 1972-1979



Source: Centers for Disease Control

Fig. 5 DEATH-TO-CASE RATES FOR LEGAL ABORTION BY WEEKS OF GESTATION, COMPARED WITH BIRTH-RELATED MORTALITY RATE, U.S., 1972-1978



Sources: Centers for Disease Control and National Center for Health Statistics

Document #2

ANNUAL SUMMARY 1978
Issued November 1980

CENTERS FOR DISEASE CONTROL

ABORTION

SURVEILLANCE

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES • Public Health Service

I. SUMMARY

In 1978 the 50 states and the District of Columbia reported 1,157,776 legally induced abortions to the Center for Disease Control, a 7% increase over 1977. The national abortion rate rose from 22 per 1,000 females aged 15-44 in 1977 to 23 in 1978. The national abortion ratio increased by 7%, from 325 to 347 per 1,000 live births, or more than 1 abortion for every 3 live births.

As in previous years, women who obtained abortions in 1978 were most often young, white, unmarried, and of low parity. Sixty-five percent were less than 25 years of age; 67% were white, and 33% were of black and other races. Seventy-four percent of all women obtaining abortions were unmarried at the time of the procedure, and 57% had had no live births. Curettage continued to be the most widely used procedure for reported legal abortions, accounting for 95% of abortions performed in 1978. Compared with 1977, the percentage of saline instillation procedures used after 15 weeks' gestation decreased, dilatation and evacuation procedures increased, and instillation of prostaglandin and other agents remained the same.

Women continued to seek abortions at earlier gestational ages; over half (52%) of all abortions were performed at less than 9 menstrual weeks' gestation, and 91% of abortions were induced within the first 12 weeks. Younger women obtained abortions at later gestations than older women. Nearly half (46%) of the abortions performed after 15 weeks of gestation were to women 19 years of age or younger. A woman's race had relatively little impact on the gestational age when she obtained an abortion.

In 1978, 27 women died from abortion, 8 fewer than the 35 who died in 1977. Compared with 1977 there was a decline in the annual number of legally induced abortion deaths; 11 women died after legally induced abortion in 1978, compared with 17 in 1977, 11 in 1976, and 31 in 1975. Four of the 11 deaths in 1978 were due to ectopic pregnancy after attempted legally induced abortion. In 1978 there were 7 deaths after illegally induced abortion and 9 deaths after spontaneous abortion. The death-to-case rate for legally induced abortions decreased from 1.4 in 1977 to 0.6 per 100,000 abortions in 1978.

The role of oxytocin in augmenting the uterine activity of second-trimester instillation abortions is controversial. To evaluate the efficacy and safety of oxytocin augmentation, we analyzed data on 10,013 women who underwent hypertonic saline instillation procedures and 1,241 women who underwent prostaglandin F2a (PGF2a) instillation procedures in the United States between 1971 and 1975. Data were obtained through the Joint Program for the Study of Abortion under the auspices of the Center for Disease Control, a multi-center, prospective, cohort study. We found that concurrent administration of oxytocin was associated with a significantly shorter instillation-to-abortion time for hypertonic saline but with a significantly longer time for PGF2a. For hypertonic saline, use of concurrent oxytocin did not affect either the success rate or the major complication rate; however, it did affect the specific type of complication that occurred. For PGF2a, use of concurrent oxytocin was associated with a lower success rate and a higher major complication rate than when PGF2a was used alone; however, the relatively small number of observations and limitations in our study design may have affected our results.

In August 1977 federal funds for financing abortions of Medicaid-eligible women were restricted. In order to study the health impact of public fund restriction, we reviewed the medical records of women with abortion complications in 3 cities for 1 year before and 1 year during the restriction. A similar analysis was done for 3 cities where public funding for legal abortions had not been restricted. Assuming that the number of complications reflects the number of abortions, we found that the restriction of public funding for legal abortions had not increased the number of illegal abortions, but that it had reduced the number of legal abortions obtained by poor women.

An estimated 30 to 55 million abortions are performed worldwide each year, making abortion one of the most prevalent means of fertility control. The majority of the world's population (60%) live in countries where abortion is permitted either on request or for social reasons. The United States was sixth of the 18 countries reporting abortion rates and eighth of the 16 countries reporting abortion ratios. In 1978 the United States reported one of the lowest percentages of abortions to women over 40 years of age (< 3%) and to women with 4 or more children (4%) and one of the highest percentages to never-married or previously married women (74%) and to women with no living children (61%).

II. NUMBER AND CHARACTERISTICS OF WOMEN RECEIVING ABORTIONS

A. Surveillance Methods

CDC receives abortion statistics by state of occurrence from 3 types of sources: 1) central health agencies, 2) hospitals and/or facilities, and 3) the Cooperative Health Statistics System (CHSS) of the National Center for Health Statistics. Table 1 summarizes the development of CDC's abortion reporting sources since the initiation of epidemiologic surveillance of abortion in 1969. The areas (including the District of Columbia) which report abortion data to CDC or CHSS have increased from 8 states in 1969 to 48 reporting areas in 1978. Central health agencies receive information either from direct reporting systems or from surveys of hospitals or abortion facilities within the state. For 1978, 40 agencies provided data directly to CDC, and 8 agencies provided data to the CHSS, which is projected to become the national data-gathering mechanism. To obtain information for this report from the 4 states which did not collect statewide abortion data, CDC directed inquiries to the hospitals and facilities in those states. Figure 1 reflects the sources of reported abortion data by state for 1978.

B. Tabulation Methods

In the past CDC has published univariate tabulations, where provided by the state, on the following variables: number of abortions, residence status, age, race, marital status, number of live births, method of abortion, weeks of gestation, and number of previously induced abortions. We also have published bivariate tabulations of abortions by weeks of gestation and type of procedure. Beginning in 1978, we are publishing the following additional bivariate tabulations, where provided by the state either directly or through the CHSS system: weeks of gestation by age, weeks of gestation by race, age by race, and marital status by race.

Percentages shown in the Summary Table may differ slightly from those in the corresponding tables, since in the former the percentages were based on known distributions. Similarly, percentages in the bivariate tables were calculated after the unknowns were excluded. Because California collected data by the variables listed above for 1976 but not for 1977 or 1978, the percentage of all abortions for which CDC has variable-specific data is lower in 1977 and 1978 than in 1976.

Live-birth data used in calculating abortion ratios were obtained from the Vital Statistics Division, National Center for Health Statistics.

C. Number of Abortions by State of Occurrence

In 1978 the 50 states and the District of Columbia reported 1,157,776 legal abortions, an increase of 7% over the 1,079,430 legal abortions reported in 1977. New York and California reported the largest number of abortions (Table 2), as they have consistently done since 1970. In 1978 these 2 states provided 28% of the national total, approximately the same percentage as in 1977 and 1976. Alaska, Idaho, New Hampshire, North Dakota, South Dakota, and Wyoming each reported fewer than 2,500 abortions in 1978. The majority of states reported an increased number of abortions performed in 1978, with only 5 states reporting a decline (Table 3). The largest percentage increases were reported from Idaho (98.8%) and Arkansas (83.9%), while the largest decreases were reported from Alaska (37.7%) and Ohio (13.1%) (Table 3).

The national abortion ratio rose in 1978 to 347 abortions per 1,000 live births, a 7% increase over 1977 (Table 1). The abortion ratios ranged from a low of 74 in Mississippi to a high of over 1,000 in the District of Columbia (Table 2). Only 7 of the 50 reporting states recorded a decrease in the abortion ratio from 1977.

The national abortion rate rose in 1978 to 23 abortions per 1,000 females aged 15 to 44, a 5% increase over 1977 (Table 1). The abortion rate ranged from a low of 6 in Alaska and Mississippi to a high of 38 in the State of New York and 171 in the District of Columbia (Table 2). The majority of the states (78%) reported an increase in the abortion rate in 1978. Only 6 states and the District of Columbia reported a decrease in the abortion rate from 1977.

D. Residence Status

In 1978, 11% of abortions were performed for out-of-state residents (Table 4), a percentage similar to that reported for 1975, 1976, and 1977 (Summary Table). In 1978 the residence status was known for 64% of women who had reported abortions. The largest proportion of abortions for out-of-state women in 1978 was again reported by the District of Columbia (54%) (Table 4). South Dakota and Kansas were next highest, both reporting nearly 40%. Declines in the percentages for out-of-state women occurred in 18 of the 39 states reporting residence status in 1978. The greatest proportion of women obtaining abortions outside their state of

residence resided in the East South Central Division (24%) and the smallest in the Pacific Division (1%) (Table 5). This is consistent with information reported in 1975, 1976, and 1977. Approximately half of resident abortions were obtained out of state in South Dakota, West Virginia, and Mississippi, while less than 1% of resident abortions were obtained out of state by women in New York, Minnesota, Colorado, Oregon, and Hawaii.

E. Age

Thirty-seven states and the District of Columbia reported abortions by age in 1978, comprising 66% of all reported abortions (Table 6). In 1978, 30% of women obtaining abortions were aged 19 or younger, 35% were 20 to 24 years old, and 35% were age 25 or older (Summary Table). This represents a continuation of the trend present since 1975 of a gradual shift from the group less than 20 years old to the 20- to 24-year age group (Summary Table and Figure 2).

In 1978 Arkansas, Kansas, Minnesota, Nebraska, New Hampshire, and South Dakota had the largest percentage of women younger than age 20 (approximately 40%); Hawaii, New Jersey, New York, and the District of Columbia had the largest percentage of women aged 25 and older (slightly more than 40%). This is a similar pattern to that reported in 1977.

A total of 32 states reported abortions by single year of age for women 15 to 19 years old (Table 7). Approximately 58% of the 189,125 abortions to women less than age 20 were obtained by women 18 years or older and 10% by women 15 or younger. This represents a slight shift to the older teenage group since 1977.

Women younger than 15 years old had the highest ratio of legal abortions to live births (1,149) followed by women 40 years old and older (788) (Table 6). The lowest abortion ratio was reported for the 25- to 29-year-old age group, 218 abortions per 1,000 live births. All age groups except the <15-year age group had a reported increase in the abortion ratio from 1977 (Figure 3).

F. Race

Although the majority (67%) of abortions in 1978 were performed on white women, the percentage of women of black and other races having abortions showed a slight decline for the first time since 1972 (Summary Table). Thirty-two states and the District of Columbia reported race in 1978, comprising 53% of all reported abortions (Table 8). Both Hawaii and the District of Columbia reported a majority of abortions for women of black and other races, and New York City and Louisiana reported more than 40% of abortions to women of black and other races.

Women of black and other races continued to have a higher abortion ratio than whites (Figure 4). Compared with 1977, the abortion ratio for blacks and other races increased from 490 per 1,000 live births to 497, and for whites it increased from 268 to 297 (Table 8).

G. Marital Status

In 1978 the majority of women (74%) obtaining abortions were unmarried at the time of abortion; this is a slightly lower proportion than the 76% reported in 1977, and it reverses the trend of increasing proportions of unmarried women observed since 1972 (Summary Table). Thirty-one states and the District of Columbia reported marital status in 1978, comprising 53% of all reported abortions (Table 9).

In 1978 unmarried women continued to have higher abortion ratios than their married counterparts (Table 9, Figure 5). The aggregate abortion ratio for unmarried women (1,471) was 13 times higher than for married women (112) (Table 9). The large difference in abortion ratios between married and unmarried women does not take into account those women who conceived premaritally and who subsequently gave birth while married. This situation would tend to shift live births from the unmarried to the married category and thereby increase the abortion ratio for unmarried women and decrease the ratio for married women.

H. Number of Live Births

An inverse relationship existed between the woman's number of live births and the percentage of abortions obtained in 1978 (Table 10). Fifty-seven percent of abortions were obtained by women who had had no live births and 4% by women who had had 4 or more births (Summary Table). This represents a slight shift toward a lower parity--compared with 1977. Twenty-nine states in 1978 included the number of live births in their reports; these comprised 44% of all reported abortions.

Women with 1 live birth had the lowest abortion ratio (201) in 1978 and those with no births had the highest (446) (Table 10). Compared with 1977, there was an increase in the abortion ratio for women with 2 or fewer live births and a decrease for those with 3 or more (Figure 6).

I. Type of Procedure

In 1978 curettage (suction, sharp, and dilatation and evacuation) was the type of procedure used in 95% of abortions compared with 94% in 1977 (Summary Table). This represents a continuation of the shift toward curettage from other methods present since 1972. Thirty-seven states and the District of Columbia reported information on type of procedure in 1978, comprising 66% of all reported abortions (Table 11). Saline and prostaglandin instillation procedures made up 3% and 1%, respectively, a slight decline from 1977. Hysterotomy and hysterectomy accounted for 0.1% of all procedures in 1978, again a slight decline from 1977.

In states where instillation procedures were used, there was often a clear preference for 1 type of procedure over the other. For example, Kansas, Nebraska, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, Virginia, and Washington used mainly saline, whereas Arkansas, Colorado, Hawaii, Montana, and Oregon used mainly prostaglandin.

J. Weeks of Gestation

In 1978 more than half (52%) of reported legal abortions were performed in the first 8 weeks of gestation (Summary Table). The majority (91%) of abortions were performed at less than 13 weeks' gestation. Approximately 4% of women obtained abortions in the 13- to 15-week interval and in the 16- to 20-week interval and only 1% at greater than 20 weeks. These proportions continue the trend noted since 1972 of an increase in the percentage of reported legal abortions performed at less than 9 weeks' gestation with a corresponding decrease in the percentage of abortions performed at later gestational ages (Summary Table). Although the proportion of abortions performed in the first and second trimesters remained the same in 1978 as in 1977, abortions were performed earlier in both trimesters (less than or equal to 8 weeks and 13-15 weeks, respectively). Thirty-seven states and the District of Columbia reported information on gestation at the time of abortion, comprising 66% of all reported abortions (Table 12).

K. Previous Induced Abortions

In 1978, 29% of abortions reported in 30 states and the District of Columbia were obtained by women who reported having had at least 1 previous induced abortion (Summary Table). Information on previous abortions was provided for 49% of all reported abortions in 1978 (Table 13). This continued the increasing trend toward repeated induced abortions reported for 1975 (18%), 1976 (20%), and 1977 (23%). Of the women who had abortions in 1978, 21% had had 1 previous abortion; 5% 2 abortions; and almost 2%, 3 or more. New York and the District of Columbia reported the highest level (34%) of women having had previous induced abortions; Nebraska had the lowest level (12%).

L. Weeks of Gestation by Type of Procedure

In 1978 curettage (suction and sharp) continued to be nearly the only method used (99%) for pregnancy termination in the first 12 weeks' gestation (Table 14). Thirty-two states reported information on weeks of gestation by type of procedure, accounting for 50% of all reported abortions in 1978. In the 13- to 15-week interval, 82% of all procedures were by curettage (dilatation and evacuation (D&E)), followed by saline instillation (10%) and prostaglandin instillation (4%). Saline instillation was the most commonly used method for both at 16-20 weeks' gestation (46%) and greater than or equal to 21 weeks (53%), with instillation of prostaglandin or other agents (e.g., urea) and D&E accounting for about 30% and 22%, respectively, in 1978. Compared with 1977, the percentage of saline instillation procedures used after 15 weeks' gestation decreased, D&E procedures increased, and instillation of prostaglandin and other agents remained the same. Since 1974, saline instillation after 15 weeks' gestation has decreased (from 72%), whereas D&E procedures and instillation of prostaglandin and other agents have increased.

M. Weeks of Gestation by Age Group

Younger women obtained abortions at later gestations than older women (Table 15). In 1978, 31 states reported data on weeks of gestation by age, accounting for 49% of all reported abortions. Over half the women in all age groups 20 or older obtained abortions in the first 8 weeks of gestation (Table 15). The tendency to obtain abortions at earlier gestational ages generally increased with the age of the woman, peaking in the 30- to 34-year-old age group. Almost 14% of abortions to women 19 years of age or younger occur after the first 12 weeks, compared with 7.4% of those to women 20 years or older. Women 19 years of age or younger appear twice as likely to obtain abortions after 16 weeks' gestation (7.3% compared with 3.7% for women 20 years of age or older) and account for almost half (46%) of the abortions performed after 16 weeks' gestation.

N. Weeks of Gestation by Race

A woman's race had relatively little impact on the gestational age when she obtained an abortion (Table 16). In 1978, 26 states reported information on weeks of gestation by race, accounting for 40% of all abortions. Women of black and other races were slightly less likely to obtain abortions in the first trimester and slightly more likely to obtain them after 16 weeks' gestation; however, these differences were less than 1.5% (Table 16).

O. Age Group by Race

Except for very young women, white women generally obtain abortions at younger ages than women of black and other races (Table 17). In 1978, 29 states reported information on age by race, accounting for 45% of all reported abortions. At all ages over 14 years, more than 68% of abortions were obtained by white women. Of the females 14 and younger who had abortions, over half (52%) were of black and other races, whereas of those 15-19 years old almost three-fourths (73%) were white. More women of black and other races (38%) were between 25 and 39 years of age when they obtained abortions than were white women (32%) in the same age group. In both racial groups--white and black and other--almost 2% of the women who had abortions obtained them after age 40.

P. Marital Status by Race

A woman's race was apparently unrelated to her marital status at the time she obtained an abortion (Table 18). In 1978, 29 states reported information on marital status by race, accounting for 41% of all reported abortions. The majority (73%) of women in both race categories were unmarried when they obtained abortions (Table 18).

Q. Interpretation

Since CDC began collecting information on legal abortion in 1969, the number of women who have had legal abortions has increased each year. In 1978 the total number of legal abortions reported to CDC rose 7% over the number reported in 1977. This was a lower percentage increase than in 1977. The abortion rate increased nearly 5%, approximately the same increase as reported for 1977; this was accompanied by a 2% decline in the United States fertility rate for 1978 (1). The abortion ratio increased nearly 7% in 1978, to 347 per 1,000 live births, a higher percentage increase than the 4% reported in 1977.

The number of abortions reported to CDC was probably less than the number actually performed in 1978. In public health surveillance, the number of reported cases is generally lower than the number obtained through surveys. In 1978, as in previous years, CDC's total was approximately 18% lower than the projected total obtained through the Alan Guttmacher Institute's nationwide survey of abortion facilities (2). The underreporting could produce some biases in the CDC data. Abortions performed in physician's offices are probably underreported more often than those performed in hospitals or other facilities (2). Since physicians probably perform abortions in their offices at earlier gestational ages of pregnancy than other facilities do, the underreporting of these data may bias the gestational age distributions toward the later stages of pregnancy.

The general availability of abortion services since 1973 has progressively allowed more women to obtain abortions within their state of residence. Since 1975 approximately 90% of women obtaining abortions have been able to have the procedures in their state of residence. The slight decrease in the proportion of in-state abortions in 1978 may reflect restrictions in public funding for abortion; restrictions would be expected to affect in-state abortions more than out-of-state procedures, since the latter do not qualify for public funding.

The age distribution of women obtaining abortions has shown a gradual shift from the group younger than 19 years of age to the 20- to 24-year age group, resulting largely from a similar shift in age distribution for women less than age 25 (3). In 1978 women at each end of the reproductive-age distribution had the highest abortion-to-live-birth ratio.

The proportion of abortions obtained by women of black and other races declined slightly for the first time since 1972. Although women of minority racial groups were still more likely to terminate pregnancy by abortion than were white women, their abortion ratio increased by a markedly smaller percentage.

Women of black and other races accounted for over half of the abortions obtained by the 14 and under age group. In part this higher percentage distribution may be because very young black teenagers are more likely to have sexual experience at an earlier age than their white counterparts (4). This is supported by an age-specific fertility rate 7 times higher for black and other teenagers in the 10- to 14-year age group than for white teenagers (1). In the 15- to 19-year age group, almost three-fourths of abortions are obtained by white teenagers. According to a recent survey, black teenagers are more likely to carry a pregnancy to term and less likely to put a child born out of wedlock up for adoption (5). A larger

proportion of black and other women in the 25- to 39-year age group obtain abortions than do white women.

In 1978 the proportion of abortions obtained by unmarried women declined for the first time since 1972. Several possible explanations exist: 1) funding restrictions may affect unmarried women to a greater extent than married women, 2) single women may have an increasing tendency to plan pregnancies which they wish to continue to term, and 3) reporting artifact. Although the fertility rate for unmarried black women was almost 6 times that of unmarried white women in 1978 (1), the proportion of unmarried women obtaining abortions was the same for both races. This may be partially due to an increased tendency for teenage black women to carry premarital pregnancies to term (5).

Women who have had no live births continued to account for an increasing proportion of abortions. Women with 3 or more births had a decline in the abortion ratio. Increasing use of the more effective contraceptive methods, primarily sterilization, may result in fewer unwanted pregnancies at these higher birth orders (6, 7).

Because the number of abortions has increased each year, the population at risk of having more than 1 abortion has increased. One would expect therefore that an increased percentage of abortions performed would be obtained by women who had undergone 1 or more previous procedures. This trend continued in 1978; 29% of abortions were obtained by women who had had at least 1 previous abortion, compared with 23% in 1977, 20% in 1976, and 18% in 1975.

In 1978, there was a continuation of the trend toward abortions at earlier gestational ages, which should have a favorable health impact by decreasing the morbidity and mortality associated with legally induced abortion procedures. Although the proportion of abortions obtained after 12 weeks' gestation remained the same as in 1977, a larger proportion was performed in the earliest interval (13-15 weeks) of the second trimester. This also would be expected to influence health parameters and may have contributed to the decreasing number of deaths from legal abortion.

III. ABORTION-RELATED MORTALITY

A. Surveillance Methods

In 1972 CDC began the epidemiologic surveillance of abortion-related mortality. The ultimate goal of the surveillance is to decrease the number of deaths from abortion by identifying factors which are amenable to change and which contribute to these deaths. In addition to reviewing such traditional factors as technical deficiencies in the provision of medical care, we also consider such nontraditional factors as community obstacles to health care and patient ignorance about sexuality, i.e., sociologic factors which may be amenable to public health intervention.

To find suspected or possible abortion-related deaths, we use several complementary methods, primarily vital statistics reports from state health departments. Of the subsequently confirmed abortion-related deaths from 1972-1978, 68% were reported through this vital statistics system. We also obtain reports from such sources as medical or hospital associations, maternal mortality committees, the National Center for Health Statistics, the Commission on Professional and Hospital Activities, published case histories, and incidental CDC investigations.

Our method of investigation consists first of confirming that a death occurred, then interviewing the attending physicians and reviewing all pertinent medical records. Where necessary, we also interview co-workers, relatives, and friends of the woman to ascertain nonmedical information such as the availability of medical services in the community, the means to pay for those services, and attitudes which may have interfered with appropriate use of medical services.

We continually update our abortion mortality statistics as we receive reports of deaths. The delay in reporting deaths to CDC has ranged from 1 hour to 6 years, with a median of 7 months. This report reflects the most current information available to CDC, and it updates previous Abortion Surveillance Reports and other CDC publications. As we learn of other abortion-related deaths, these will be included in subsequent publications. For the most current information on abortion-related deaths, interested persons should contact CDC directly rather than rely solely on published data.

B. Definitions

The Abortion Surveillance Reports of 1975-1977 described the process by which we established the definitions we used for abortion mortality surveillance. In the 1978 Abortion

Surveillance Report we have expanded these definitions to clarify their use in complex cases. A group of experts assisted in the process.*

1) Induced Abortion: A procedure (as contrasted with a complication) intended to terminate a suspected or known intrauterine pregnancy and to produce a nonviable fetus at any gestational age. For this definition, the deciding factor is the intent of the procedure rather than its result. Thus, if the procedure failed to have any effect on the pregnancy, we would nevertheless consider it an induced abortion. Also, if the person performing the procedure were under the mistaken impression the woman had an intrauterine pregnancy with a living embryo or fetus, then we would consider the procedure an induced abortion, regardless of whether the woman in fact had an ectopic or molar pregnancy, or no pregnancy at all. However, if a molar pregnancy, ectopic pregnancy, or death of the fetus had already been diagnosed before any intervention, then we would not regard the procedure as an induced abortion.

We subcategorize induced abortions as "legal" or "illegal" as follows:

a) Legal abortion: A procedure performed by a licensed physician or someone acting under the supervision of a licensed physician.

b) Illegal abortion: A procedure performed by the woman herself, or by someone who was neither a licensed physician nor acting under the supervision of a licensed physician.

2) Spontaneous abortion: Either of the following types of complications of pregnancy, occurring before completion of the 20th menstrual week of gestation and not caused by an induced abortion:

a) Complete or incomplete expulsion of the products of conception from the uterus;

b) Failure of embryonic development or death of the fetus in utero, without any of the above complications.

We assume that these complications occurred spontaneously unless:

a) The woman admitted to someone that she had undergone an induced abortion; or

b) Physical or pathological examination of the woman revealed trauma to the reproductive tract suggestive of an induced abortion.

3) Unknown category of abortion: If we cannot obtain sufficient information to categorize an abortion using the above criteria, then we place it in the "unknown" category.

4) Abortion-related death: A death which resulted from a direct complication of an abortion, an indirect complication caused by the chain of events initiated by the abortion, or aggravation of a preexisting condition by the physiologic or psychologic effects of the abortion. To minimize the possibility of our failing to recognize an abortion-related death, we regard as abortion-related any death occurring within 42 days of an abortion, and any death resulting from an illness which began within 42 days after an abortion. Unlike traditional definitions of maternal death, which exclude deaths occurring beyond 42 days after the termination of pregnancy, we include as abortion-related any death which is attributable to abortion, regardless of how long it occurred after the abortion.

5) Ectopic pregnancy: Our review of abortion-related deaths since 1972 has identified 10 deaths from ectopic pregnancy occurring soon after an attempted legally induced abortion. In the 1978 Abortion Surveillance Report, we consider these deaths as abortion-related and include them as a separate subcategory of legally induced abortion (Figure 7). However, for analytic purposes, in our calculation of legally induced abortion death-to-case rates (Tables 19 to 23), these 10 deaths from ectopic pregnancy will not be aggregated with the other causes of death from legally induced abortion. The review panel felt that the pathophysiologic process leading to death from ectopic pregnancy was not causally related to either the woman's choice of induced abortion or the physician's choice of the abortion procedure. Thus, a woman who died from an ectopic pregnancy after an attempted curettage at 7 menstrual weeks' gestation would not be included in our aggregate analyses in either the "curettage" or the " 8 weeks' gestation" categories.

*William E. Brenner, M.D., Mark C.E. Cheng, M.D., Mary E. Converse, R.R.A., Irvin M. Cushner, M.D., Joseph H. Davis, M.D., Richard E. Dixon, M.D., John I. Fishburne, M.D., C. E. Gibbs, M.D., Sadja Greenwood, M.D., Perry A. Henderson, M.D., Lester T. Hibbard, M.D., Jane E. Hodgson, M.D., Irwin H. Kaiser, M.D, Richard H. Kaslow, M.D., Mary Grace Kovar, M.S., Sue Meads, Ervin E. Nichols, M.D., Ruth Roemer, J.D., Harold Schulman, M.D., Richard H. Soderstrom, M.D., Lee B. Stevenson, M.D., Steele F. Stewart, Jr., M.D., Phillip G. Stubblefield, M.D., Christopher Tietze, M.D., and Louise B. Tyrer, M.D.

C. Behavioral Risk Factors

In instances of abortion-related deaths we believe that the causal risk factors most likely to be preventable are those which involve voluntary behavior. We divide these behavioral risk factors into the following categories:

1) Patient factors: Inadequate use of contraception, delay in obtaining a legal abortion, and delay in obtaining medical care for an obvious complication.

2) Community factors: Unavailability of contraceptive services, legal abortion, or medical care of complications, and deterrents to the use of services, such as consent requirements which breach confidentiality.

3) Physician factors: Delay in diagnosis, delay in treatment, and use of relatively ineffective or hazardous methods of treatment.

4) Health-care facility factors: Deficient resources (drugs, equipment), inadequately skilled personnel, or policies which contribute to delayed or inadequate treatment (pertaining either to the facility that provides abortion services or to the facility that provides care for complications).

Unlike the "factors of responsibility" of traditional maternal mortality studies (described in the Abortion Surveillance Reports of 1975, 1976, and 1977), the behavioral risk factors described above do not necessarily involve any errors for which someone is to blame. On the contrary, the individuals or institutions concerned may behave as they do for reasons beyond their control. For example, a patient should not be blamed for her delay in obtaining medical services if this delay is caused by inability to pay for such services provided in her community. Neither should a physician be blamed for using an inferior method of treatment if the hospital in which he or she works lacks the equipment necessary to provide better treatment.

We have reviewed 106 abortion-related deaths that occurred in 1975-1977. From this review we have determined, for each category of abortion, the proportion of the deaths to which each behavioral risk factor contributed. In Table 24, we have presented the risk factors which contributed to at least 10% of the legal, illegal, and spontaneous abortion-related deaths.

The proportion of abortion-related deaths to which each behavioral risk factor contributed provides some measure of the effect of the risk factor on abortion mortality. It can thus help in identifying the particular factors which deserve priority in prevention. As can be seen in Table 24, the behavioral risk factors which contributed to the greatest proportion of legal and spontaneous abortion-related deaths involved the woman's delay in seeking medical care, either to obtain a legal abortion or for treatment of an obvious complication.

Patient factors, rather than physician factors, appear to be the behavioral factors which deserve priority in prevention. Many of the patient factors may be secondary to community factors, although we were unable to identify the latter in most of the deaths.

D. Total Abortion Mortality

Twenty-seven women died from abortion in 1978, 8 fewer than in 1977 (Figure 8). The fluctuation in the number of total abortion deaths in the last 3 years reflects variations within each of the 3 abortion categories--legally induced, illegally induced, and spontaneous. In 1978 the number of deaths after both legally induced and spontaneous abortions decreased, while the number after illegally induced abortions increased (Figure 7).

The inclusion of the 10 deaths between 1972 and 1978 from ectopic pregnancy after attempted legally induced abortion has increased both the total number of abortion-related deaths and those after legally induced procedures (see below). This accounts for most of the discrepancy between the total number of deaths reported in the current Abortion Surveillance Report and previous editions.

E. Legal Abortion Mortality

Eleven women died after legal abortions in 1978, compared with 17 in 1977, 11 in 1976, and 31 in 1975 (Figure 7). Of the 11 deaths in 1978, 4 were from ectopic pregnancy, compared with 2 of 17 in 1977, 0 of 11 in 1976, and 2 of 31 in 1975. Thus, the number of deaths from legally induced abortion excluding ectopic pregnancy contained in our aggregate analyses are 7 in 1978, 15 in 1977, 11 in 1976, 29 in 1975, 25 in 1974, 25 in 1973, and 24 in 1972. In 1978 a total of 1,157,776 legal abortions were reported to CDC. With this figure used as the denominator, the overall death-to-case rate for legal abortion (excluding ectopic pregnancy) was 0.6 per 100,000 abortions in 1978 (Table 19). This is not significantly different from the rate of 1.4 in 1977, and 1.1 in 1976 ($p > .05$, chi-square test). The death-to-case rates for legal abortion in 1976-1978 were significantly lower ($p < .01$) than those in earlier

years (3.4 in 1975, 3.2 in 1974, and 4.1 in both 1973 and 1972) (Table 19). Possible reasons for the decline after 1975 are: 1) the increasing percentage of abortions performed during the earlier, safer gestational ages, 2) increasing experience with abortion by practicing physicians, 3) the increasing percentage of abortions performed by safer methods, such as dilatation and evacuation (D&E), and 4) underreporting of legal abortion related deaths after 1975.

The aggregated data for the years 1972-1978 show that the risk of death from legal abortion was lowest for women whose abortions were performed at less than 9 menstrual weeks' gestation, with a death-to-case rate of 0.5 per 100,000 procedures (Table 20). The death-to-case rate increased by approximately 75%-100% for each week of delay after the eighth week through the 20th week. Abortions performed at 9-10 weeks were 2.8-fold more dangerous in terms of mortality than those performed earlier. Abortions performed at more than 20 weeks carried the greatest risk, with a death-to-case rate 35 times that of abortions performed at less than 9 weeks.

For purposes of categorizing deaths associated with particular abortion methods, we aggregated all procedures of suction curettage, sharp curettage, and D&E as instrumental evacuation procedures. These are subcategorized by gestational age at the time of abortion: procedures performed at less than 13 completed menstrual weeks of gestation are referred to as curettage procedures (including suction and sharp curettage), and those performed at 13 or more weeks' gestation are referred to as evacuation procedures (or D&E). Procedures which consist primarily of either hysterotomy or hysterectomy are referred to as hysterotomy/hysterectomy procedures.

For the years 1972-1978, mortality rates were highest for hysterotomy/hysterectomy abortions, and lowest for instrumental evacuation (including D&E), with instillation procedures intermediate (Table 21). Instrumental evacuation had a death-to-case rate of 1.3 per 100,000 abortions, compared with 12.5 for instillation, and 41.3 for hysterotomy/hysterectomy. Fifty-three women died from curettage procedures, 18 from D&E, 38 from saline instillation, 9 from prostaglandin instillation, 3 from use of other chemical abortifacients (e.g., urea, oxytocin), 9 from hysterotomy/hysterectomy, and 6 from other or unknown methods (Table 22).

Applying the type of procedure by weeks' gestation distributions from the reporting states (Table 14) to the total number of abortions reported from 1972-1978, we obtained denominators on which to calculate death-per-case rates specific for both procedure and gestation (Table 23). Because many states categorize prostaglandin instillation under the "other" category, for the purpose of this table we have had to group prostaglandin instillation with "other" methods in the denominator of the death-to-case rate for prostaglandin instillation. Deaths that occurred from other methods such as intrauterine insertion of rubber catheters were not included in the numerators of calculations for specific methods in the body of Table 23, but were included in the row labeled "total."

From 1972 through 1978, the risk of death due to instrumental evacuation procedures increased with gestational age. Curettage procedures had a death-to-case rate of 0.4 per 100,000 abortions at less than 9 weeks, 1.3 at 9-10 weeks, and 2.3 at 11-12 weeks; D&E procedures had a death-to-case rate of 5.6 per 100,000 abortions at 13-15 weeks, 14.1 at 16-20 weeks, and 13.5 at more than 20 weeks. Our data do not permit us to compare the risk of death from instrumental evacuation at 4-6 weeks with that at 7-8 weeks.

Although a woman's overall risk of dying is greater from D&E than it is from curettage procedures, it is significantly less ($p < .05$) than the risk from either of the 2 instillation procedures (last column, Table 23). From 1972-1978, D&E had an overall death-to-case rate of 7.7 per 100,000 abortions, compared with 13.9 for saline instillation and 9.0 for prostaglandin instillation (including other agents). The marked variation between prostaglandin and saline instillation within specific gestational age intervals is probably statistical artifact because of the relatively small number of deaths and cases involved. Moreover, denominators for calculating procedure-specific death-to-case rates among the instillation methods are distorted by categorization discrepancies among the different states reporting to CDC. Evaluated with the chi-square test, the death-to-case rates for various instillation methods at each gestational age are not significantly different ($p > .05$).

The following case history provides examples of behavioral factors contributing to the risk of death from legal abortion:

> Case History--A 26-year-old, divorced, white woman had had 1 previous pregnancy terminated by a legal abortion in 1972. She used oral contraceptives intermittently between 1972 and 1977, but because of side effects finally stopped using them entirely. She then tried an intrauterine contraceptive

device, but it was expelled. She subsequently used no method of contraception.

On December 20, 1977, she visited a medical clinic because of nausea, myalgia, and constipation. Physical examination revealed epigastric and right lower quadrant abdominal tenderness. Her last menstrual period began on November 10, 1977, almost 6 weeks previously, and a Gravindex pregnancy test was positive. On learning that she was pregnant, the woman immediately arranged for an abortion, which was performed on December 28. The woman underwent a suction curettage procedure with local anesthesia in an abortion clinic in a nearby metropolitan area. At this clinic the physicians did not routinely examine the products of conception except through the wall of the transparent suction tubing as tissue was aspirated from the uterus. The tissue was neither weighed nor examined in a watch glass with a dissecting scope. The aspirated material from all patients was collected together in a single bottle; therefore, it was unsuitable for patient-specific histopathologic examination. The procedure was uneventful, and the woman was told to expect lower abdominal cramps for a few days.

Two days later the woman began complaining of abdominal cramps, chills, and fever which persisted through the next day. Her roommate urged her to seek medical advice, but she refused. By the morning of January 2, 1978, she was extremely weak and was suffering from generalized pain, most marked in the abdomen and knees. Despite extreme pain and the proximity of a hospital across the road, she refused to seek medical care. She was in bed when her roommate left for work; when her roommate returned in the evening, she was dead.

Autopsy revealed 4,000 ml of blood in the peritoneal cavity and a ruptured ectopic pregnancy at the isthmus of the right fallopian tube. The fetal size was consistent with a 10 weeks' gestation.

The following behavioral factors contributed to the risk of death in the above case: 1) the woman was not using contraception when she conceived an unwanted pregnancy, 2) the woman's inadequate use of contraception was partly attributable to the community's failure to develop a reliable, acceptable contraceptive which was free from side effects, 3) routine procedures of the abortion clinic did not include an examination of the uterine aspirate to confirm products of conception in the appropriate quantity, 4) the abortion clinic staff told the woman to expect lower abdominal cramps, thus possibly contributing to her delay in seeking medical advice, and 5) the woman failed to seek medical advice despite obvious symptoms of illness or complication.

In this instance, the abortion increased the woman's risk of dying from a ruptured ectopic pregnancy because she was expecting symptoms, and thus failed to seek medical care appropriately. In similar cases, abortion procedures have contributed to death by leading physicians to misinterpret postabortal signs and symptoms as pelvic infection instead of ruptured ectopic pregnancy. Still other examples of deaths from ectopic pregnancy involve missed opportunities to diagnose an ectopic pregnancy, but are not abortion-related deaths because the abortion procedure itself does not increase the risk of death. This case emphasizes the importance of examining tissue removed from the uterus to confirm that it comprises the products of conception. This should be done before the woman leaves the abortion facility, because she may be impossible to contact afterwards, or the ectopic pregnancy may rupture before the pathology report is available. If products of conception are not found on initial or repeated curettage, the woman should be warned that she may have an ectopic pregnancy, and her condition should be further evaluated.

F. Illegal Abortion Mortality

Seven deaths were due to illegally induced abortion in 1978, an increase of 3 above the 4 reported in 1977 (Figure 7). We regard the number of deaths from illegal abortions as a reflection of the number of illegal abortions performed. The decline in the annual number of these deaths before 1977 probably reflected the increased availability of safer, legal procedures throughout the country, many of which were publicly funded.

In 1977 the Supreme Court ruled that states had the right to restrict the use of public funds for legal abortion services, and in August 1977 funds for abortion (mainly Medicaid funds) were restricted on the federal level. Over the next several months, 34 states similarly restricted state funds for abortion for Medicaid-eligible women. We have not detected a large increase in the number of deaths from illegal abortions resulting from these public policy decisions. The increase in 1977 and 1978 might be due to random fluctuation in the

occurrence of a rare event. However, the illegal abortions from which at least 4 women died during these two years may have been related to restricted public funds for legal abortions. One of these case histories was presented in the 1977 Abortion Surveillance Report. The case history of another woman, who died in 1978, is presented here:

Case History--A 21-year-old unemployed, single, black woman with a 5-year-old child resided with her father in a city of 350,000, in a state which had restricted public funds for legal abortions. There was only 1 publicly funded family planning clinic in the city, and a waiting period of several weeks was necessary for an appointment. The woman had only $10 in savings. Her contraceptive history is unknown.

In early May 1978 the woman recognized that she was pregnant. There were 3 abortion clinics in her city, but she could not afford the minimum charge of $150. In the second week of May, she inserted cotton-tipped swabs into her uterus to induce an abortion.

Over the next 2 weeks she had fever, chills, nausea, and diarrhea, which became increasingly severe. She was unable to eat or drink and became so weak that she was unable to walk. Finally, on June 5, 1978, her father took her to the family physician, who advised immediate hospitalization.

The woman had not yet told anyone that she might be pregnant. She told the admitting gynecology resident that she had fallen down 8 steps 2 weeks earlier and had passed blood and tissue from the vagina for 7 days. To a nurse, however, she confessed that she had attempted to induce an abortion because of financial hardship.

When she was admitted to the hospital, physical examination revealed a temperature of 105.6 F, pulse 108/min, respirations 34/min, blood pressure 150/70, and diffuse tenderness and guarding in the lower abdomen. The uterus was enlarged, but its size could not be accurately measured because of guarding. The cervix was soft, dilated, and tender to motion. There was no active bleeding. All other physical findings were normal. Laboratory results revealed anemia, with a hemoglobin of 8.3 gm/dl, hematocrit 24.2%, and white blood cell count of 7,100, with the differential count shifted to the immature side. Serum sodium was only 134 mEq/l, but blood urea nitrogen was elevated to 25 mg/dl. Results of chest x-ray were normal. The admission diagnosis was septic abortion with anemia and dehydration.

Bacteriologic cultures of blood and endometrium were obtained, and the patient was treated with massive doses of penicillin, gentamicin, and chloramphenicol intravenously. She received a transfusion of 2 units of blood. The following day she underwent a curettage of the uterus, and necrotic fragments of placenta were removed. She remained febrile, with temperature rising as high as 106.7 F. For a presumptive diagnosis of septic pelvic thrombophlebitis, she was given heparin and corticosteroids intravenously.

Despite treatment, the patient's vital signs remained highly elevated (temperature 102-106 F, pulse 120-140/min, respirations 40-60/min). Chest x-ray findings suggested pulmonary embolism. Because a pelvic abscess was suspected, on June 8, 1978, the patient underwent exploratory laparotomy. No intra-abdominal abscess was found, but ligation of the inferior vena cava and left ovarian vein was performed to try to prevent further pulmonary embolism.

Over the next 2 weeks the patient remained febrile. Multiple lung abscesses developed, and pulmonary function deteriorated. Medical consultants recommended a repeat laparotomy to search for a pelvic abscess. This was done on June 15, 1978, and again no pelvic abscess was found. A supracervical hysterectomy was performed to remove any possible nidus of infection in the uterus. The patient had a cardiac arrest during the procedure and could not be resuscitated.

Autopsy revealed multiple lung abscesses and empyema on the right side. Culture of the pus grew Bacteroides species. The examination of the uterus showed endometritis.

This case illustrates several characteristic behavioral factors which contribute to the risk of death from an illegal abortion: 1) the community in which the woman resided did not provide adequate family planning services, 2) the community did not subsidize legal abortion services for poor women, and this reduced the alternatives available to her, leading the woman to attempt self-induced illegal abortion, 3) the woman delayed seeking medical care for an obvious illness (possibly because she lacked money or feared criminal prosecution for the abortion), 4) the woman initially hid the fact that she had induced abortion from the admitting physician, thereby leading to a further delay in treatment, and 5) the physician delayed emptying the uterus (for a day) after diagnosing a septic abortion.

Table 14
Percentage of Reported Legal Abortions, by Weeks of Gestation and Type of Procedure,* 1978

Weeks of Gestation	Type of Procedure					
	Curettage	Intrauterine Saline Instillation	Intrauterine Prostaglandin Instillation	Hysterotomy/ Hysterectomy	Other	Total
≤ 8	51.6 (98.9)	1.6 (0.1)	1.3 (0.0)	31.4 (0.1)	30.0 (0.9)	49.2 (100.0)
9-10	29.5 (99.1)	2.1 (0.2)	1.6 (0.1)	17.2 (0.1)	10.2 (0.6)	28.1 (100.0)
11-12	13.8 (97.2)	4.3 (0.9)	3.8 (0.3)	14.2 (0.1)	12.4 (1.4)	13.4 (100.0)
13-15	3.9 (82.1)	15.0 (10.0)	16.9 (4.3)	13.1 (0.3)	9.3 (3.3)	4.4 (100.0)
16-20	1.0 (24.6)	59.6 (45.6)	63.2 (18.7)	20.3 (0.5)	26.4 (10.6)	3.9 (100.0)
≥ 21	0.1 (12.8)	17.4 (52.8)	13.2 (15.4)	3.8 (0.4)	11.7 (18.6)	1.0 (100.0)
Total	100.0 (94.3)	100.0 (2.9)	100.0 (1.1)	100.0 (0.1)	100.0 (1.5)	100.0 (100.0)

*Based on data from 32 states

Table 20

Death-to-Case Rate for Legal Abortions, by Weeks of Gestation, United States, 1972-1978

Weeks of Gestation	Deaths[1]	Abortions[2]	Rate[3]	Relative Risk[4]
≤ 8	13	2,749,725	0.5	1.0
9-10	24	1,705,478	1.4	2.8
11-12	20	883,932	2.3	4.6
13-15	20	300,186	6.7	13.4
16-20	47	338,488	13.9	27.8
≥ 21	12	68,584	17.5	35.0
Total	136	6,046,393	2.2	

[1]Excludes deaths from ectopic pregnancy
[2]Based on distribution of 4,292,615 abortions (71.0%) with weeks of gestation known
[3]Deaths per 100,000 abortions
[4]Based on index rate for ≤8 menstrual weeks' gestation of 0.5 per 100,000 abortions

Table 21

Death-to-Case Rate for Legal Abortions, by Type of Procedure, United States, 1972-1978

Type of Procedure	Deaths[1]	Abortions[2]	Rate[3]	Relative Risk[4]
Instrumental evacuation	71	5,550,874	1.3	1.0
Intrauterine instillation	50	400,315	12.5	9.6
Hysterotomy/ Hysterectomy	9	21,810	41.3	31.8
Other[5]	6	73,394	8.2	6.3
Total	136	6,046,393	2.2	

[1]Excludes deaths from ectopic pregnancy
[2]Based on 4,334,991 abortions (71.7%) with type of procedure known
[3]Deaths per 100,000 abortions
[4]Based on index rate for instrumental evacuation of 1.3 per 100,000 abortions
[5]Includes 2 deaths with type of procedure unknown

Table 22
Legal Abortion Deaths* by Type of Procedure
and Weeks of Gestation, United States, 1972-1978

Type of Procedure	Weeks of Gestation ≤ 8	9-10	11-12	13-15	16-20	≥ 21	Total
Curettage	12	22	19				53
Dilatation and evacuation				10	7	1	18
Instillation				5	36	9	50
(Saline)				(1)	(31)	(6)	(38)
(Prostaglandin)				(3)	(5)	(1)	(9)
(Other agents)				(1)	(0)	(2)	(3)
Hysterotomy/ Hysterectomy	0	2	1	3	2	1	9
Other[1]	1	0	0	2	2	1	6
Total	13	24	20	20	47	12	136

[1]Includes 2 deaths with unknown type of procedure, 1 at 13-15 weeks and 1 at 16-20 weeks of gestation

*Excludes deaths from ectopic pregnancy

Table 23
Death-to-Case Rate* for Legal Abortions,
by Type of Procedure and Weeks of Gestation
United States, 1972-1978

Type of Procedure	Weeks of Gestation ≤ 8	9-10	11-12	13-15	16-20	≥ 21	Total
Curettage	0.4	1.3	2.3				1.0
Dilatation and evacuation				5.6	14.1	13.5	7.7
Instillation	0.0	0.0	0.0	8.2	14.2	19.5	12.3
(Saline)	(0.0)	(0.0)	(0.0)	(2.2)	(17.6)	(17.1)	(13.9)
(Prostaglandin and other agents[1])	(0.0)	(0.0)	(0.0)	(24.8)	6.4)	(26.7)	(9.0)
Hysterotomy/ Hysterectomy	0.0	55.5	37.2	68.3	45.2	147.3	42.8
Total[2]	0.4	1.4	2.4	8.2	15.2	22.1	2.2

[1]Denominators for rates include abortions reported as type of procedure "other" (1% of all abortions with procedure known)
[2]Includes deaths with type of procedure "other" (4) and unknown (2)

*Deaths per 100,000 abortions; based on distributions of abortions with type of procedure and weeks of gestation known

Document #3

Journal of The American College of Obstetricians and Gynecologists

Obstetrics and Gynecology

Volume 58 October 1981 Number 4

Deaths from Second Trimester Abortion by Dilatation and Evacuation: Causes, Prevention, Facilities

WILLARD CATES, Jr, MD, MPH, AND DAVID A. GRIMES, MD

In 1978, dilatation and evacuation (D & E) became the leading method of abortion at 13 weeks' gestation or later in the United States. The increasing popularity of D & E reflects its relative advantages in safety, convenience, expense, and speed when compared with alternate methods. The authors reviewed all reported deaths from D & E in the United States between January 1, 1972, and December 31, 1978. The predominant causes of death were infection and hemorrhage. Both race and gestational age significantly influence the death:case rate for D & E procedures. White women had a threefold lower risk of dying from D & E than women of other races. D & E procedures performed at 13 to 15 weeks' gestation were nearly 3 times safer than those performed at 16 weeks or later. D & E performed in nonhospital settings did not have higher death:case rates than those performed in hospitals. Comparative mortality data suggest abortion by D & E at 13 weeks' gestation or later is more dangerous than suction curettage performed earlier in gestation, but safer than instillation techniques performed later. The advantage of D & E occurs largely in the 13- to 15-week gestation interval, that is, at the beginning of the second trimester. Policy makers should reconsider laws requiring all second trimester abortions to be performed in hospitals. Based on these data, 16 weeks' gestation would be a more appropriate threshold at present. *(Obstet Gynecol 58:401, 1981)*

From the Abortion Surveillance Branch, Family Planning Evaluation Division, Centers for Disease Control, Atlanta, Georgia.
Submitted for publication June 10, 1981.

Dilatation and evacuation (D & E) has emerged as the leading method of second trimester abortion in the United States. In 1978, D & E accounted for 51% of all abortions at 13 weeks' gestation or later.[1] Over three quarters (77%) of D & E procedures are performed in the 13- to 15- week gestation interval, although 20% are performed in the 16- to 20-week interval, and 3% at 21 weeks' gestation or later.[1]

The increased popularity of D & E for second trimester abortion reflects its relative advantages in safety, convenience, expense, and speed when compared with alternate methods.[2] Over the past 6 years, numerous case series,[3-12] prospective observational studies,[13-19] and 1 randomized clinical trial[20] have documented the superiority of D & E to other second trimester procedures.

Despite these reported advantages, some authorities believe that widespread use of D & E by physicians inexperienced in this technique may increase the risks of the procedure.[21] Others believe that second trimester D & E is so risky that it should only be performed in hospitals.[22] They predict that increasing use of D & E in nonhospital facilities will cause an increase in the incidence of deaths and complications.

This article reviews all reported deaths from D & E in the United States between January 1, 1972, and December 31, 1978. The causes of these deaths are criti-

0029-7844/81/100401-08$02.50

cally examined, and suggestions are offered to prevent them. The death:case rates for D & E and other second trimester procedures are compared, and, finally, the risk of death from D & E procedures performed in hospital and nonhospital settings is determined.

Methods

Abortion-related deaths were identified through the Centers for Disease Control's ongoing surveillance of abortion mortality, the methods of which have been described in detail previously.[1] D & E procedures are defined as those transcervical evacuation methods performed at 13 menstrual weeks' gestation or later. These procedures frequently involve using a combination of instruments: vacuum equipment, a sharp curette, and special forceps.[2] Gestational age for each procedure in which a woman died was determined by postoperative measurements of fetal size,[23,24] rather than by less objective preoperative estimates. Using these postoperative objective measures, the duration of gestation is expressed as completed menstrual weeks throughout the report.

The Centers for Disease Control's annual abortion surveillance activities[1] provided denominators for the death:case rates. The type of procedure was cross-tabulated by gestational age from those states that reported these data, and was applied to the total number of second trimester abortions reported in the period from 1972 to 1978. The age and race distributions for women obtaining D & E procedures were assumed to be the same as those for all women obtaining second trimester abortions.

Since data supplied to the Centers for Disease Control do not include numbers of abortions by type of abortion facility, this information was obtained from the annual surveys of providers of abortion services conducted by the Alan Guttmacher Institute.[25-27] In these surveys a nonhospital clinic was defined as a facility that was not physically connected to a hospital and that was organized to provide abortions and medical services on an ambulatory patient basis. Abortions performed on an outpatient basis in hospitals or hospital-based clinics were categorized as hospital abortions. For deaths after D & E procedures, these definitions were used to categorize the facility in which the abortion was performed.

The Alan Guttmacher Institute collected information by the type of facility in which second trimester abortions were performed for only the years 1976 through 1978. To obtain estimates for 1972 through 1975, the linear regression curve derived from the known second trimester facility distributions (ie, 1976 to 1978) was applied to the unknown distributions (ie, 1972 to 1975). Because instillation procedures generally terminate inside hospitals, all second trimester abortion procedures performed in nonhospital facilities were further assumed to be by D & E.

Because the relatively small number of deaths limited the authors' statistical extrapolations, 95% confidence limits for the death:case rates were calculated. From the Poisson distribution,[28] the 95% confidence limits were applied to the numerator (the number of deaths); these numbers were then divided by the estimated denominators (numbers of abortions) to derive the 95% upper and lower bounds of the death:case rates.

Case Reports

Eighteen women died in the period from 1972 to 1978 from second trimester D & E abortions (Table 1). The women's ages ranged from 16 to 37 years; 11 were black, 6 were white, and 1 was Hispanic. Three were primigravidas. Ten were in the 13- to 15-week gestational age interval, 7 in the 16- to 20-week interval, and 1 had a gestational age greater than 20 weeks. Of the 18 women, 12 had preexisting conditions that either hindered the preoperative evaluation or contributed to the death. In 8 cases, gestational age was underestimated by at least 4 weeks.

Eleven women died after having D & E procedures performed in nonhospital clinics, and 7 women died after having procedures performed in hospitals. In 5 of the deaths, a delay of more than 24 hours occurred between the onset of the woman's initial postabortion symptoms and her eventual referral by the physician to a hospital.

The predominant causes of death were infection and hemorrhage. Eight infections were secondary to incomplete evacuation of the uterine contents (Table 1). In 5 of these 8 cases, the physician had underestimated the gestational age by 4 weeks or more. Seven women died from hemorrhage, 5 of which cases were caused by uterine perforation. The 3 other causes of death were a toxic reaction after paracervical anesthesia, a pulmonary thromboembolism 4 weeks after the abortion, and a suicide by carbon monoxide inhalation.

Death:Case Rates

In the United States for the 7 years between 1972 and 1978, D & E methods had an overall death:case rate of 7.7 per 100,000 procedures (Table 2). Age had little effect on the risk of dying from D & E. Women over 30 had a slightly higher death:case rate than younger women, but the difference was small and not statistically significant ($P > .30$).

However, both race and gestational age significantly influenced the death:case rate for D & E procedures. White women had a threefold lower risk than women of other races of dying from D & E. D & E procedures

THIS PAGE INTENTIONALLY LEFT BLANK.

Table 1. Deaths Associated with Dilatation and Evacuation in the United States Between 1972 and 1978

Case no.	Age	Race	Parity	Gestation (wk)		Preexisting conditions	Facility	Cause of death
				Estimated	Actual			
Infection								
1	27	W	G-1 P-0	12*	16	Obesity, abdominal scar	Clinic	Peritonitis and septic shock from incomplete evacuation
2	23	B	G-2 P-1	13	13	Obesity, recent PID	Hospital	Peritonitis and septic shock from uterine perforation and incomplete evacuation
3	19	W	G-1 P-0	8*	15	None	Hospital	Peritonitis and septic shock from incomplete evacuation
4	16	B	G-2 P-1	12*	16	None	Clinic	Peritonitis and septic shock from incomplete evacuation
5	18	B	G-2 P-1	12*	17	Obesity	Clinic	Peritonitis and septic shock from incomplete evacuation
6	23	B	G-2 P-1	9*	13	None	Clinic	Peritonitis and septic shock from incomplete evacuation
7	16	W	G-2 Ab-1	17	17	Unrecognized ventricular septal defect	Hospital	Acute bacterial endocarditis of aortic valve and ventricular septum causing acute congestive heart failure 2 wk after the abortion
8	16	B	G-1 P-0	20	20	None	Clinic	Septic shock and adult respiratory distress syndrome after amnionitis and endometritis
Hemorrhage								
9	37	B	G-4 P-3	8*	14	Obesity	Clinic	Hypovolemic shock caused by hemorrhage after incomplete evacuation
10	32	B	G-6 P-3 Ab-2	14	14	Obesity, anemia	Hospital	Hypovolemic shock caused by hemorrhage from cervical and uterine perforation
11	26	B	G-6 P-3 Ab-2	17	17	Anemia	Hospital	DIC and hypovolemic shock caused by hemorrhage from uterine perforation
12	29	H	G-5 P-4	12*	21	Previous cervical laceration	Clinic	Hypovolemic shock caused by hemorrhage from cervical and uterine perforation
13	18	W	G-3 P-2	11*	16	None	Clinic	Hypovolemic shock caused by hemorrhage from uterine perforation
14	34	B	G-7 P-6	14	14	Obesity, sarcoidosis, hypertension, concurrent tubal ligation	Clinic	Hypovolemic shock caused by hemorrhage from uterine perforation
15	25	B	G-5 P-3 Ab-1	14	14	Previous hemorrhagic diathesis after suction curettage	Hospital	DIC and pulmonary hemorrhage occurring immediately after completion of dilatation and evacuation
Other								
16	20	B	G-2 P-1	12	14	None	Clinic	Cardiovascular collapse from toxic reaction to paracervical anesthesia
17	26	W	G-3 P-1 Ab-1	14	14	Past thrombophlebitis on oral contraceptives	Clinic	Pulmonary thromboembolism 4 wk after abortion
18	19	W	G-2 P-0 Ab-1	14	14	Suicidal threats, sociopathic personality	Hospital	Suicide by carbon monoxide inhalation 4 days after abortion

LMP = last menstrual period; W = white; B = black; H = hispanic; G = gravidity; P = parity; Ab = abortus; PID = pelvic inflammatory disease; DIC = disseminated intravascular coagulation.

* Discrepancy of 4 weeks or more between the preoperative estimate and actual gestational age.

Table 2. Death : Case Rates for Dilatation and Evacuation Procedures, by Woman's Age, Race, Weeks' Gestation, and Type of Facility in the United States Between 1972 and 1978

Characteristic	No. of deaths	Estimated no. of procedures	Death : case rate*
Woman's age			
≤ 19	7	103,100	6.8 (3–14)
20–29	8	105,400	7.6 (3–15)
≥ 30	3	25,800	11.6 (2–34)
Race			
White (including Hispanic)	7	154,700	4.5 (2–9)
Black and other	11	79,600	13.8 (7–25)
Gestational age (wk)			
13–15	10	177,300	5.6 (3–10,
≥ 16	8	57,000	14.0 (6–28)
Type of facility			
Clinic	11	160,200	6.9 (3–12)
Hospital	7	74,100	9.4 (4–20)
Total	18	234,300	7.7 (5–12)

* Deaths per 100,000 procedures. The 95% confidence limits are in parentheses.

performed at 13 to 15 weeks' gestation were nearly 3 times safer than those performed at 16 weeks or later. Apparently these 2 factors were not interrelated, as 7 of the 10 women of black and other races who died after D & E had their procedures performed at 13 to 15 weeks' gestation; thus, the relative difference in death : case rates between white and nonwhite women was greater at 13 to 15 weeks than at later gestational ages.

D & Es performed in nonhospital settings had lower death : case rates than those performed in hospitals (Table 2). However, for reasons elucidated below, these differences should be interpreted cautiously.

When D & E was compared with other abortion methods, its death : case rate was found to be higher than that of curettage procedures performed earlier in gestation, but lower than rates of the other second trimester alternatives (Table 3). The death : case rates were 1.0 per 100,000 procedures for curettage abortions performed at 12 weeks' gestation or earlier; 12.3 for second trimester instillation procedures; and 42.8 for hysterotomy/hysterectomy procedures. However, because the risk of death from D & E is directly related to gestational age, the death : case rate in the 13- to 15-week interval (5.6/100,000) is significantly ($P < .05$) less than at 16 weeks' gestation or later (14.0/100,000). Thus, the lower risk of dying from D & E compared with instillation techniques appears primarily related to the comparative advantages of D & E in the 13- to 15-week period.[29] After 15 weeks' gestation, the death : case rates for D & E and instillation agents are quite similar (Table 3).

Discussion

Comparative Risks

The death : case rates for D & E in the United States are consistent with British data. In the 6 years between 1968 and 1973, Great Britain reported a fatality rate for D & E of 6.6 per 100,000 procedures,[30] compared with 7.7 per 100,000 in the United States. This similarity between American and British death : case rates for D & E procedures suggests that these data accurately portray the risk of death from the procedure.

Although age was not a factor influencing the risk of dying from D & E, race was. Women of black and other nonwhite races had death : case rates 3 times higher than those of white women. Moreover, controlling for gestational age widened this apparent difference between the 2 racial groups. The increased risk of complications and death from abortion and other pregnancy-related events for women of black and other races has been reported in previous articles.[31,32] Race may represent the influence of economic status, and these numbers may reflect differences in medical care received by different income groups.

Table 3. Death : Case Rates by Type of Abortion Method and Gestational Age in the United States Between 1972 and 1978

Type of method and gestational age	No. of deaths	Estimated no. of procedures	Death : case rate*	95% CL†
D & E (≥ 13 weeks)	18	234,300	7.7	5–12
13–15 weeks	10	177,200	5.6	3–10
≥ 16 weeks	8	57,000	14.0	6–28
Curettage (≤ 12 weeks)	53	5,385,200	1.0	0.7–1.3
Instillation (≥ 13 weeks)	50	405,900	12.3	9–16
Saline	38	273,000	13.9	10–19
Prostaglandin and other agents	12	132,900	9.0	5–16
Hysterotomy/hysterectomy	9	21,000	42.8	20–81

* Deaths per 100,000 procedures.
† 95% confidence limits.

For any abortion performed by uterine evacuation techniques, gestational age is the most important variable affecting risk. Previous investigations of abortion morbidity have shown that complications after D & E in the second trimester are both more frequent and more severe than after first trimester curettage procedures.[2] The data on abortion mortality demonstrate that D & E at 13 weeks' gestation or later carries higher risks of dying than uterine evacuation procedures performed earlier in gestation; moreover, D & E procedures performed earlier in the second trimester are safer than those performed later.

The other available second trimester abortion techniques had higher aggregate death:case rates than did D & E, largely due to the comparative advantage of D & E in the 13- to 15-week gestational age interval. Beyond 15 weeks, the risks of death from D & E and instillation procedures are similar. Since comparative mortality data do not differentiate among abortion procedures at 16 weeks' gestaton or later, perhaps other factors, such as cost, convenience, psychologic impact on the woman, psychologic impact on the staff, and risk of long-term complications, play a greater role than short-term safety in choosing the appropriate method.[2]

Preventing Deaths from D & E

This analysis of the causes of death suggests several approaches to reduce the risk of dying after D & E: 1) perform D & E procedures earlier in the second trimester; 2) determine gestational age as accurately as possible; 3) use laminaria or other gradual methods for preoperative dilatation; and 4) refer women with suspected complications to facilities equipped to manage the complications.

As emphasized above, the risks of D & E increase as the pregnancy progresses. Thus, as with all instrumental evacuation procedures, the earlier the D & E is performed the better. Anything that contributes to delay in performing abortions increases the complication rates by 15 to 30%,[33,34] and the chance of dying by 50%[32] for each week of delay. Because the risks of morbidity and mortality with D & E are higher than with suction curettage, the marginal increase in risk from the same amount of delay is even greater for D & E. Thus, for example, the risks imposed by a mandatory 72-hour waiting period for an abortion are quite small for early suction curettage procedures, but are magnified for later second trimester D & E.

Accurate assessment of gestational age before performing D & E may also lower risks. In 5 of the 8 infection deaths and 3 of the 7 hemorrhage deaths, physicians had underestimated the true length of gestation. This inaccuracy could have led to incomplete abortion or perforation of the uterus during attempts to remove fetal parts through an inadequately dilated cervix. One study of uterine perforation has documented that misestimation of uterine size contributes to the risk of perforation.[35] Moreover, the highest rate of reported uterine perforation with D & E was in a study that involved a discrepancy between the preoperative and postoperative estimates of gestational age.[11]

Seven of the 8 deaths in which physicians had underestimated the length of gestation occurred in clinics. In part, this may have represented a deliberate misestimate in order to conform with state laws requiring second trimester abortions in hospitals. Alternatively, unintentional underestimation also can occur with even experienced clinicians.[11] To reduce errors, some physicians obtain preoperative sonograms on all patients in the second trimester to confirm gestational age, whereas others use this technique only when there is a discrepancy between menstrual dates and uterine size estimations. Although accurate determination of length of gestation might reduce complications and deaths from D & E, routine use of sonography increases both the cost and inconvenience of the procedure.

Use of laminaria or other gradual methods for preoperative cervical dilatation before evacuation may also reduce the risk of cervical injury, uterine perforation, and retained tissue, all of which have contributed to hemorrhage, infection, and eventual death. Wider dilatation is usually necessary to remove uterine contents at later gestational ages. Laminaria,[36] balloon devices,[37] and prostaglandin suppositories[38] have been used to achieve slower, more "physiologic," dilatation than mechanical dilators. However, like sonography, use of these methods increases the cost and inconvenience to the woman.

Because complications after D & E procedures are both more frequent and more severe than those after curettage procedures earlier in gestation,[2] clinicians should refer women with suspected complications promptly. Unfortunately this has not always been the case. In at least 5 of the deaths in the present study, women were not referred promptly for conditions requiring immediate evaluation and treatment unavailable in the original facilities. Some physicians delayed referral because they feared criticism from their colleagues for performing unconventional D & E procedures. Others were afraid of prosecution. In those states that require that all abortions later than 12 weeks' gestation be performed in hospitals, clinicians were reluctant to admit that they had inadvertently initiated an abortion in a nonhospital facility on a

woman beyond the legal gestational age. Fearing both rejection by their colleagues and prosecution by law enforcement officials, these physicians were hesitant to send their patients to a hospital for further treatment. In these situations, the abortion regulations requiring hospitalization in the second trimester hindered rapid and appropriate care.

D & E Procedures in Hospital or Nonhospital Facilities

The crude death:case rate for D & E procedures performed in nonhospital facilities was lower than that for D & E performed in hospitals. However, these differences must be viewed cautiously for several reasons: 1) the small number of deaths involved does not allow statistical differentiation at the traditional level of .05; 2) selective underreporting of deaths from either nonhospital or hospital facilities may have occurred; 3) as described previously, the denominators are estimates based on challengable assumptions; yet, when only those procedures performed between 1976 and 1978 were analyzed, the same difference in death:case rates between hospitals and nonhospitals still appeared; 4) women having abortions in nonhospital clinics may be different from women having their procedures performed in hospitals. For example, women who are not hospitalized for abortions may be healthier or may have had their procedures performed earlier in the second trimester.

Many of these factors would spuriously raise the death:case rate for D & E performed in hospitals compared with those performed in nonhospital facilities. For example, the authors' previous comparisons[39,40] of the risk of dying from suction curettage procedures at 12 weeks' gestation or earlier showed higher crude death:case rates for hospitals; however, after controlling for preexisting conditions and concurrent sterilization, the differences disappeared. Moreover, it is likely that D & E in clinics may be performed earlier in the second trimester than those performed in hospitals.[41] Thus, whether D & Es can be performed more safely in nonhospital facilities cannot be determined from the available data.

Some clinicians emphasize that deaths from D & E could have been prevented if the procedure had been performed in hospitals rather than in clinics. For example, the 4 women who died from internal hemorrhage after uterine perforation in a nonhospital facility might have benefited from immediate availability of blood bank services. Yet, performing D & E procedures in hospitals does not provide complete protection; 3 of the 7 deaths from hemorrhage after D & E occurred in hospitals with blood banks.

These data do not support regulations in some states requiring all second trimester abortions to be performed in hospitals. These laws were encouraged by the Supreme Court's decision on abortion in 1973, which allowed states to regulate second trimester abortions in the interests of the woman's health. Data forming the basis for this decision were collected before 1972, when the available second trimester methods were primarily saline instillation and hysterotomy.[42] Since 1973, however, abortion techniques have improved, physicians have accumulated greater experience, and the concept of trimester threshold for uterine evacuation procedures has been largely abandoned. Case series[10,11] have demonstrated that some physicians can safely perform D & E in nonhospital facilities, thus decreasing the cost and increasing the convenience for the woman. The comparative mortality data indicate that performing D & E outside of hospitals carries no greater risk of death. Thus, it is time to reconsider restrictive regulations that have not kept pace with medical practice.

Recently, judicial decisions in some states have redefined their upward gestational age limit for performing second trimester abortions outside of hospitals.[43] New Jersey, North Carolina, Louisiana, Wisconsin, and Missouri allow abortions up through 16 weeks' gestation in nonhospital facilities. However, decisions in Ohio and Indiana have upheld the validity of requiring that all second trimester abortions be performed in hospitals. As of now, 16 states still maintain laws or regulations with a second trimester hospitalization requirement.[44]

The data do not identify the appropriate gestational age limit for requiring that all abortions be performed in hospitals. One practitioner has reported safely performing D & E through 20 weeks' gestation in nonhospital settings.[10] To require this physician to perform his procedures in hospitals might only increase the costs without improving the safety. However, as a general rule, it is reasonable to perform procedures with death:case rates of approximately 10/100,000 or less outside the hospital; this level of risk would include such common procedures as tonsillectomy, laparoscopic tubal sterilization, and diagnostic dilatation and sharp curettage.[45] For D & E, this would permit moving the threshold for required hospitalization from 12 to 16 weeks' gestation. As abortion techniques and physicians' skills improve further, the threshold could be slowly advanced. Proposed changes should be based on scientific evidence gathered through ongoing surveillance, however, rather than on unsubstantiated opinions.[45]

Moreover, because the risks of D & E are greater than those of suction procedures performed at an ear-

lier gestational age, certain prudent approaches are recommended for those nonhospital facilities wishing to perform outpatient abortions beyond 12 weeks' gestation: 1) the physician should be thoroughly experienced in first trimester curettage procedures; 2) the physician should advance cautiously the gestational age threshold as experience is gained with the uterine evacuation procedures performed later in gestation; 3) the facilities should agree to monitor their patients closely and to report complication rates regularly to state or local health authorities; 4) the facilities should agree to be inspected when necessary by professional colleagues; 5) the facilities must provide continued availability of postoperative care on a 24-hour basis; and 6) arrangements for emergency care should be established with hospitals near the nonhospital facility.

In conclusion, comparative mortality data suggest abortion by D & E at 13 weeks' gestation or later is more dangerous than suction curettage performed earlier in gestation, but safer than instillation techniques performed later. The advantage of D & E occurs largely in the 13- to 15-week gestation interval. Policy makers should reconsider laws requiring all second trimester abortions to be performed in hospitals. Based on these data, 16 weeks' gestation would be a more appropriate limit for nonhospital abortions at the present time.

References

1. Centers for Disease Control: Abortion Surveillance 1978. Atlanta, GA, Centers for Disease Control, November 1980
2. Grimes DA, Cates W Jr: Midtrimester abortion by dilatation and evacuation, Second Trimester Abortion. Perspectives after a Decade of Experience. Edited by GS Berger, WE Brenner, L Keith. Littleton, MA, PSG Publishing, 1981
3. Stewart GK, Goldstein P: Medical and surgical complications of therapeutic abortions. Obstet Gynecol 40:539, 1972
4. DeLee ST: Termination of pregnancy in the midtrimester using a new technique: Preliminary report. Int Surg 61:545, 1976
5. Stubblefield PG, Albrecht BH, Koos B, et al: A randomized study of 12-mm and 15.9-mm cannulas in midtrimester abortion by laminaria and vacuum curettage. Fertil Steril 29:512, 1978
6. Barr MM: Mid-trimester abortions—12 to 20 weeks by dilatation and evacuation method under local anesthesia. Advan Planned Parent 13:16, 1978
7. Hanson MS: Midtrimester abortion: Dilatation and extraction preceded by laminaria, Pregnancy Termination: Procedures, Safety and New Developments. Edited by GI Zatuchni, JJ Sciarra, JJ Speidel. Hagerstown, MD, Harper & Row, 1979, pp 191–192
8. Peterson WF: Dilatation and evacuation: Patient evaluation and surgical techniques," pp 184–190
9. Hodari AA, Peralta J, Quiroga PJ, et al: Dilatation and curettage for second trimester abortions. Am J Obstet Gynecol 127:850, 1977
10. Hern WM, Oakes AG: Multiple laminaria treatment in early midtrimester outpatient suction abortion: A preliminary report. Adv Planned Parent 12:93, 1977
11. Burnhill MS: Vaginal second-trimester abortion, Risks, Benefits and Controversies in Fertility Control. Edited by JJ Sciarra, JJ Speidel, G Zatuchni. Hagerstown, MD, Harper & Row, 1978, pp 331–347
12. Altman A, Stubblefield PG, Parker K, et al: Midtrimester abortion by laminaria and vacuum extraction on a teaching service: A review of 789 cases. Adv Planned Parent 16:1, 1981
13. Tietze C, Lewit S: Joint Program for the Study of Abortion (JPSA): Early medical complications of legal abortion. Stud Fam Plann 3:97, 1972
14. Tietze C, Lewit S: Joint Program for the Study of Abortion (JPSA): Early medical complications of abortion by saline. Stud Fam Plann 4:133, 1973
15. Brenner WE, Edelman DA: Dilatation and evacuation at 13 to 15 weeks' gestation versus intra-amniotic saline after 15 weeks' gestation. Contraception 10:171, 1974
16. Grimes DA, Schulz KF, Cates W Jr, et al: Midtrimester abortion by dilatation and evacuation: A safe and practical alternative. N Engl J Med 296:1141, 1977
17. Smith RG, Steinhoff PG, Palmore JA: Potential reduction of medical complications from induced abortions. Int J Gynaecol Obstet 15:337, 1978
18. Kaltreider NB, Goldsmith S, Margolis AJ: The impact of midtrimester abortion techniques on patients and staff. Am J Obstet Gynecol 135:235, 1979
19. Cadesky KI, Ravinsky E, Lyons ER: Dilation and evacuation: A preferred method of midtrimester abortion. Am J Obstet Gynecol 139:329, 1981
20. Grimes DA, Hulka JF, McCutchen MF: Midtrimester abortion by dilatation and evacuation versus intraamniotic instillation of prostaglandin $F_{2\alpha}$: A randomized clinical trial. Am J Obstet Gynecol 137:785, 1980
21. Flowers CE: Discussion on hyperosmolar urea for midtrimester abortion. Am J Obstet Gynecol 131:14, 1978
22. World Health Organization: Induced abortion. Technical Reports Series 623. Geneva, World Health Organization, 1978
23. Streeter GL: Weight, sitting height, head size, foot length, and menstrual age of human embryos. Contrib Embryol 11:143, 1920
24. Brenner WE, Edelman DA, Hendricks CH: A standard of fetal growth for the United States of America. Am J Obstet Gynecol 126:555, 1976
25. Forrest JD, Sullivan E, Tietze C: Abortion 1976–1977. Need and services in the United States, each state and metropolitan area. New York, Alan Guttmacher Institute, 1979, pp 48–50
26. Forrest JD, Sullivan E, Tietze C: Abortion in the United States, 1977–1978. Fam Plann Perspect 11:329, 1979
27. Henshaw S, Forrest JD, Sullivan E, et al: Abortion in the United States, 1978–1979. Fam Plann Perspect 13:6, 1981
28. Diem K, Lentner C (eds): Scientific Tables. Seventh edition. Basle, CIBA-GEIGY, 1970, p 107
29. Grimes DA, Cates W Jr: Gestational age limit of 12 weeks for abortion by curettage. Am J Obstet Gynecol 132:207, 1978
30. Kestelman P: Legal abortion mortality. IPPF Reg Bull 7:8, 1978
31. Cates W Jr: Legal abortion: Are American blacks healthier because of it? Phylon 38:267, 1977
32. Cates W Jr, Tietze C: Standardized mortality rates associated with legal abortion: United States, 1972–1973. Fam Plann Perspect 10:109, 1978
33. Edelman DA, Brenner WE, Berger GS: The effectiveness and complications of abortion by dilatation and vacuum aspiration versus dilatation and rigid metal curettage. Am J Obstet Gynecol 119:673, 1974

34. Cates W Jr, Schulz KF, Grimes DA, et al: The effect of delay and choice of method on the risk of abortion morbidity. Fam Plann Perspect 9:266, 1977
35. Conger SB, Tyler CW Jr, Pakter J: A cluster of uterine perforations related to suction curettage. Obstet Gynecol 40:551, 1972
36. Stubblefield PG: Present techniques for cervical dilatation, Dilatation of the Uterine Cervix. Edited by F Naftolin, PG Stubblefield. New York, Raven, 1980, pp 335–342
37. Southern EM: A new device for pre-operative cervical dilatation. IPPF Med Bull 14:3, 1980
38. Kirton KT: Use of prostaglandins for dilatation of the cervix.[36] pp 355–361
39. Grimes DA, Cates W Jr, Tyler CW Jr: Comparative risk of death from legally induced abortion in hospitals and nonhospital facilities. Obstet Gynecol 51:323, 1978
40. Grimes DA, Cates W Jr, Selik RM: Abortion facilities and the risk of death. Fam Plann Perspect 13:30, 1981
41. Cates W Jr, Schulz KF, Gold J, et al: Complications of surgical evacuation procedures for abortions after 12 weeks' gestation.[7] pp 206–217
42. Stroh G, Katz SH, Hinman AR: Performing second-trimester abortions: Rationale for inpatient basis. NY State J Med 75:2168, 1975
43. Donovan P: Courts rejecting "maternal health" rationale for hospitalization for all mid-trimester abortions. Fam Plann/Pop Reporter 9:91, 1980
44. Wennberg JE, Bunker JP, Barnes B: The need for assessing the outcome of common medical practices. Ann Rev Public Health 1:277, 1980
45. Relman AS: On controversy in medicine. Pharos: 18, 1978

Address reprint requests to:
Willard Cates, Jr, MD, MPH
Centers for Disease Control
Center for Health Promotion and Education
Family Planning Evaluation Division
Atlanta, GA 30333

Accepted for publication July 16, 1981.

Copyright © 1981 by The American College of Obstetricians and Gynecologists.

Document #4

Mortality From Abortion and Childbirth

Are the Populations Comparable?

Scot A. LeBolt; David A. Grimes, MD; Willard Cates, Jr, MD, MPH

• **Critics have challenged previous comparisons of mortality from legal abortion and childbirth for contrasting population groups with different clinical characteristics. They allege that most women dying from abortion were young, white, and healthy, while those dying from childbirth had serious underlying conditions. To address this question, we calculated standardized abortion and childbirth mortality rates between 1972 and 1978. We also adjusted independently for preexisting medical conditions. These adjustments for demographic and health differences between the two populations actually widened the difference in the mortality risk between abortion and childbirth. Thus, between 1972 and 1978, women were about seven times more likely to die from childbirth than from legal abortion, with the gap increasing in the more recent years.**

(*JAMA* 1982;248:188-191)

OUR COMPANION article (p 192) addresses the issue of whether the crude data comparing mortality from legal abortion and childbirth for the woman contained statistical biases favoring the safety of abortion; we conclude they did not. Rather, the crude data between 1972 and 1978 appear to overestimate the abortion risks for the woman, compared with the risks of childbirth.

See also p 192.

However, another separate allegation by some critics[1,2] is that the populations of women dying from either abortion or childbirth are not clinically comparable. These critics claim that most women who died from abortion were young, white, and healthy and that those who died from continuing their pregnancies to term had serious underlying medical conditions. We undertook this study to address this question and also to update our previous data.[3,4] In this report we present standardized abortion and childbearing mortality rates between 1972 and 1978. We also adjusted independently for the presence of preexisting conditions. These more recent data corroborate that, in terms of risk of death, abortion is safer than childbearing.

From the Family Planning Evaluation Division, Center for Health Promotion and Education, Centers for Disease Control, Atlanta.

Reprint requests to the Family Planning Evaluation Division, Center for Health Promotion and Education, Centers for Disease Control, Atlanta, GA 30333 (Dr Grimes).

METHODS

The various sources of data for comparing mortality from legal abortion and childbearing are described in detail in the companion article (p 192). For this analysis, we used the number of abortion-related deaths from the Centers for Disease Control's (CDC) ongoing nationwide surveillance of abortion mortality[5]; we used as a denominator the total number of abortions reported by the Alan Guttmacher Institute (AGI).[6] We applied the annual CDC distributions of age and racial characteristics of women obtaining abortions[7] to the AGI totals to estimate distributions of abortions by age and race for each year.

We obtained all data on maternal deaths and live births in the United States from the national vital statistics system of the National Center for Health Statistics.[7,8] To determine the number of deaths from childbearing, we excluded all abortion-related deaths and deaths from ectopic pregnancies from the total number of maternal deaths. We calculated the childbearing mortality rate as the number of these deaths per 100,000 live births. The effect of excluding deaths from abortion and ectopic pregnancy from maternal deaths in calculating childbearing mortality rates presents a conservative estimate of this risk.

We used two independent approaches to control for potential differences between our comparison populations of women terminating pregnancy v women continuing their pregnancies to term. We first adjusted for demographic characteristics by standardizing both the abortion and the childbearing mortality rates directly

Table 1.—Death-to-Case Rates for Legal Abortion, by Year, Age, and Race, 1972 Through 1978

Characteristic	No. of Deaths	No. of Abortions*	Rate†
Year			
1972	24	587,000	4.1
1973	25	745,000	3.4
1974	25	899,000	2.8
1975	29	1,034,000	2.8
1976	11	1,179,000	0.9
1977	17	1,317,000	1.3
1978	7	1,410,000	0.5
Age, yr			
≤19	29	2,292,000	1.3
20-24	49	2,382,000	2.1
25-29	26	1,314,000	2.0
30-34	17	669,000	2.5
≥35	17	494,000	3.4
Race			
W	65	4,975,000	1.3
B and other	73	2,196,000	3.3
Total	138	7,170,000	1.9

*Specific numbers may not add to total due to rounding.
†Deaths per 100,000 abortions.

Table 2.—Childbearing* Mortality Rates by Year, Age, and Race, 1972 Through 1978

Characteristic	No. of Deaths	No. of Live Births†	Rate‡
Year			
1972	494	3,258,000	15.2
1973	395	3,137,000	12.6
1974	383	3,160,000	12.1
1975	326	3,144,000	10.4
1976	333	3,168,000	10.5
1977	309	3,327,000	9.3
1978	268	3,333,000	8.0
Age, yr			
≤19	352	4,144,000	8.5
20-24	582	7,855,000	7.4
25-29	627	6,652,000	9.4
30-34	479	2,807,000	17.1
≥35	468	1,070,000	43.7
Race			
W	1,525	18,274,000	8.3
B and other	983	4,253,000	23.1
Total	2,508	22,527,000	11.1

*Excludes death from abortion and ectopic pregnancy.
†Specific numbers may not add to total due to rounding.
‡Deaths per 100,000 live births.

by age, race, and year. We then adjusted independently for health status by calculating risk-specific death-to-case rates for legal abortion and comparing them with published data on maternal mortality.

For our demographic comparison, we used the method of direct standardization[9] to adjust mortality rates. Age-, race-, and year-specific rates were each directly standardized by the other two variables. We used as our reference population the distributions of the white women 19 years old or younger obtaining abortion in 1972, respectively, for each of the standardized rates.

For our health status comparison, we used the criteria suggested by Nathanson[10] to determine which preexisting conditions were considered so potentially life threatening that they justified a therapeutic abortion. We determined the prevalence of these conditions among women who died from legal abortion in 1972 through 1978 by reviewing individual case reports of deaths. Detailed clinical information about 114 of the 138 abortion-related deaths was available for analysis. The prevalence rate for preexisting conditions (34%) among the 114 abortion deaths was applied to the 24 abortion deaths lacking this information.

No reliable nationwide data are available for denominators on the prevalence of preexisting conditions among women undergoing either abortion or childbearing. To estimate the prevalence of preexisting conditions among all women obtaining abortions in 1972 through 1978, we used the rates of women with preexisting conditions in hospital and nonhospital facilities that participated in our large multicenter study conducted from 1971 through 1975.[11]

Table 3.—Death-to-Case Rates for Legal Abortions and Corresponding Childbearing Mortality Rates, by Year, Age, and Race, 1972 Through 1978

	Abortion Rate*		Childbearing Rate†		Relative Risk‡
	Crude	Standardized	Crude	Standardized	
Year					
1972	4.1	4.1	15.2	18.8	4.1
1973	3.4	3.2	12.6	13.9	4.3
1974	2.8	2.8	12.1	13.9	5.3
1975	2.8	2.8	10.4	12.0	4.8
1976	0.9	0.8	10.5	11.7	14.8
1977	1.3	1.2	9.3	10.4	8.7
1978	0.5	0.4	8.0	9.1	22.8
Age, yr					
≤19	1.3	1.3	8.5	7.7	5.9
20-24	2.1	2.1	7.4	7.9	3.8
25-29	2.0	2.0	9.4	11.6	5.8
30-34	2.5	2.3	17.1	20.1	8.7
≥35	3.4	3.2	43.7	48.3	14.5
Race					
W	1.3	1.3	8.3	8.2	6.3
B and other	3.3	3.5	23.1	23.1	6.6
Overall	1.9	1.8	11.1	12.5	6.9

*Deaths per 100,000 abortions.
†Deaths per 100,000 live births.
‡Ratio of standardized childbearing rate to standardized abortion rate.

We applied these rates to the total number of abortions performed throughout the country in each type of facility during the seven-year interval. Using this approach, we estimated 1.3% of women obtaining abortions between 1972 and 1978 had preexisting conditions.

RESULTS

Secular Trends

One hundred thirty-eight women died from legal abortion from 1972 through 1978. Between 1972 and 1975, the annual number of abortion-related deaths remained stable, with a mean of 25.8±1.9 (SD of population). After 1975, the number of deaths declined to a mean of 11.7±4.1 (SD of population) (Table 1). This trend of decreased deaths in later years, combined with the progressively increasing number of abortions performed, has led to a 72% reduction in the crude death-to-case rates, from 3.2 deaths per 100,000 abortions for the years 1972 through 1975 to 0.9 deaths per 100,000 abortions for 1976

Table 4.—Serious Preexisting Medical Conditions Among Women Who Died From Legal Abortion, 1972 Through 1978

Condition	No.	%
One or more	39	34.2
Chronic heart disease	13	11.4
Obesity*	11	9.6
Hypertension†	6	5.3
Chronic respiratory tract disease	3	2.6
Chronic renal disease	3	2.6
Sickle cell disease	1	0.9
Chronic degenerative CNS disease	1	0.9
Thromboembolic disease	1	0.9
None	75	65.8
Total	114	100.0

*These women were a mean 70.6% ± 17.5% over ideal body weight for height according to Metropolitan Life tables.

†These women each had a systolic BP of 130 mm Hg or higher and a diastolic BP of 90 mm Hg or higher.

Table 5.—Estimated Death-to-Case Rates for Legal Abortion, by Preexisting Medical Conditions, 1972 Through 1978

Medical Status	No. of Deaths	No. of Abortions	Rate*
No serious preexisting medical conditions	91	7,077,000	1.3
One or more serious preexisting medical conditions	47	93,000	50.5
Total	138	7,170,000	1.9

*Deaths per 100,000 abortions.

through 1978 (Table 1). In contrast, the number of childbearing deaths has declined steadily, but at a slower pace (Table 2). This more gradual decline, coupled with the relatively constant number of births, has led to a 26% reduction in the crude childbearing death-to-case rate, from 12.6 per 100,000 live births in 1972 through 1975 to 9.3 per 100,000 live births in 1976 through 1978.

During the entire study interval, the standardized relative risk of childbearing was sevenfold higher than the standardized relative risk of abortion (Table 3). Because of the steep decline in the abortion death-to-case rate, this gap actually widened after 1975.

Demographic Factors

In general, younger women had lower death-to-case rates from either pregnancy outcome than did older women (Tables 1 and 2). The lowest rates were in the 19-years-or-younger age group of women obtaining abortions and in the group of women aged 20 to 24 years undergoing childbearing. Women aged 35 years or older had the highest rates for both groups. For all ages, childbearing had a higher risk of death than abortion. After standardization, the death-to-case rate for women 35 years or older who underwent childbearing was nearly 15-fold greater than for those who obtained abortion (Table 3).

Women of minority races were at a greater risk of death than white women for both pregnancy outcomes (Tables 1 and 2). Women of black and other races obtaining abortion had a mortality rate 2.5 times higher than white women (Table 1). Similarly, women of black and other races were 2.8 times more likely to die from childbearing than were white women (Table 2). For both racial groups, legal abortion had a lower mortality rate than childbearing (Table 3).

Preexisting Conditions

More than one in three women who died from legal abortion between 1972 and 1978 had preexisting medical conditions serious enough to qualify them for therapeutic abortions under Nathanson's criteria (Table 4). Chronic heart disease and morbid obesity were the two predominant preexisting conditions. However, hypertension, chronic respiratory tract disease, and chronic renal disease each occurred in at least three of the abortion-related deaths.

The death-to-case rate from legal abortion for women with one or more preexisting conditions was 39 times higher than that for healthy women (Table 5). Women with medical problems severe enough to justify abortion had a death-to-case rate of more than 50 per 100,000 procedures, compared with the rate of 1.3 for healthy women.

COMMENT

Deaths after legally induced abortions have fallen sharply since 1975, in contrast with the gradual decline in childbearing deaths. During our study interval, the number of legal abortions has increased progressively while that of live births has remained constant. Consequently, the difference between the risk of death from childbearing *v* the risk of death from legal abortion has widened from fivefold in 1972 through 1974' to more than tenfold in 1976 through 1978. During the most recent three-year interval, abortion has become even safer compared with childbearing.

As demonstrated in our companion article, these comparisons probably underestimate the relative safety of abortion for pregnant women. The CDC's surveillance techniques apparently identify 94% of all abortion-related deaths, while traditional vital statistics systems detect 50% to 75% of childbearing-related deaths. Abortion deaths, therefore, appear more likely than childbearing deaths to be reported completely. The abortion death-to-case rate would be correspondingly larger based on differential ascertainment.

We directly standardized the death-to-case rates to control for potentially distorting demographic factors. After this standardization, the relative risk of childbearing increased compared with abortion; the unadjusted relative risk of childbearing compared with abortion was 5.8, while the adjusted relative risk was 6.9. This difference occurs because relatively fewer women of the higher-risk ages and races are in the childbearing population. For example, 31% of women in the abortion population were of black and other races, in contrast to only 19% in the childbearing population. Adjusting the rates to the same population raises the risk for childbearing compared to abortion.

Gestational age is an important

risk factor for deaths after legal abortion.[14] However, as our previous analysis demonstrated,[4] the technique of standardization primarily affects comparisons among other categories of abortion mortality (such as age, race, and year). The crude and standardized rates were similar for gestational age and had little effect on comparisons between abortion and childbearing. To reflect more accurately the independent risk of increasing gestational age, a life-table analysis of pregnancy-related mortality rates would be preferable.[13]

For a proxy, we can use gestational age-specific death-to-case rates for women dying from abortion during our seven-year study interval.[3] At eight or fewer weeks' gestation, when more than half the procedures are performed, the risk of death from abortion was more than 20 times lower than that of childbearing. This difference declines as gestational age increases, but abortion remains the safer procedure with respect to the woman's life at gestational ages at least up through 16 weeks.

A recent analysis[2] has attempted to compare mortality risks of induced abortion and "natural pregnancy" in the first and second 20 weeks of pregnancy; it concluded that natural pregnancy was safer in both intervals.[2] However, this analytic approach fails to recognize that the woman who has successfully completed the first 20 weeks of pregnancy is still at risk of death in the next 20 weeks.[11] A woman obtaining an induced abortion, however, is obviously not subject to the risks of continuing her pregnancy to term.

Approximately one third of women who died from legal abortion between 1972 and 1978 had medical conditions serious enough to meet Nathanson's criteria for therapeutically terminating a pregnancy. However, his criteria do not include such conditions as diabetes mellitus, thrombophlebitis, and multiple sclerosis. Because these conditions were excluded, we believe our estimate of 34% of women dying from abortions having serious preexisting conditions to be somewhat conservative (Table 4).

Women with Nathanson's preexisting conditions had an abortion-related mortality rate nearly 40 times that of women without them. Confounding factors alone cannot account for this large difference, since the distribution of the women's age, race, and gestational age was relatively similar between the two groups. Women with preexisting conditions dying from abortion were slightly older than healthy women dying from abortion (mean ages, 28 and 24 years, respectively), but this difference is neither statistically nor clinically significant. The gestational age was nearly identical for the two groups, being 15.0 menstrual weeks for women with preexisting conditions and 14.6 for women without preexisting conditions. Similarly, the racial distribution for women with and without preexisting conditions was comparable, 49% and 45% being white, respectively.

If the women with preexisting conditions are removed from analysis, the death-to-case rate for legal abortion is lowered considerably. For example, the aggregate death-to-case rate from 1972 through 1978 drops from 1.9 deaths per 100,000 abortions to 1.3 deaths per 100,000 abortions. During the most recent three years, healthy women had a death-to-case rate of six deaths per 1 million abortions. The best estimate, therefore, of the current risk of dying from legal abortion for healthy women in the United States is less than one per 100,000 procedures.

No national data exist to allow calculation of the risk of childbearing for women with and without serious preexisting conditions. For purposes of comparison, however, approximately 14% of women who died from childbearing in New York State between 1970 and 1976 appear to have had one or more of Nathanson's preexisting conditions.[14] If New York State data are representative of childbearing deaths elsewhere, more women dying from abortion than those dying from childbearing had serious preexisting medical conditions. This might occur if ill women, on their physician's advice, opted to terminate their pregnancies for therapeutic reasons. Thus, contrary to some assertions,[1] pregnant women with serious preexisting health problems may be more likely to terminate their pregnancies through induced abortion than to continue their pregnancies to term. Therefore, comparative mortality data may be spuriously weighed against abortion.

CONCLUSION

Neither demographic nor health factors account for the lower risks of death from legal abortion compared with death from childbearing. Adjusting for these variables increases the apparent magnitude of the relative safety of abortion. The risk of a healthy woman's dying from elective abortion is extremely rare; in 1972 through 1978 her risk was approximately one per 100,000 abortions. Women with serious preexisting conditions have a greatly increased mortality rate regardless of the pregnancy outcome. However, even for these women, abortion is probably the safest option in terms of mortality risks.

References

1. Testimony of T. W. Hilgers, given before the Royal Commission on Human Relationships, May 21, 1975, Sydney, Australia, reprinted in *Hearings Before the Subcommittee on Constitutional Amendments of the Senate Subcommittee on the Judiciary*, 94th Cong, 1st sess, post IV, 1975, p 724.

2. Hilgers TW, O'Hare D: Abortion-related maternal mortality: An in-depth analysis, in Hilgers TW, Horan DJ, Mall D (eds): *New Perspectives in Human Abortion*. Frederick, Md, Aletheia Books, University Publications of America Inc, 1981, pp 69-91.

3. Cates W Jr, Grimes DA, Smith JC, et al: Legal abortion mortality in the United States: Epidemiologic surveillance, 1972-1974. *JAMA* 1977;237:452-455.

4. Cates W Jr, Tietze C: Standardized mortality rates associated with legal abortion: United States, 1972-1975. *Fam Plann Perspect* 1978; 10:109-112.

5. *Abortion Surveillance, 1978*, US Dept of Health and Human Services publication 80-8276. Atlanta, Centers for Disease Control, November 1980.

6. Henshaw S, Forrest JD, Sullivan E, et al: Abortion in the United States, 1978-1979. *Fam Plann Perspect* 1981;13:6-18.

7. *Vital Statistics of the United States*, National Center for Health Statistics. Government Printing Office, 1972-1978, vol 2: *Mortality*.

8. *Vital Statistics of the United States*, National Center for Health Statistics. Government Printing Office, 1972-1978, vol 1: *Natality*.

9. Spiegelman M, Marks HH: Indexes of mortality and tests of their statistical significance. *Hum Biol* 1966;38:280-292.

10. Nathanson BN: *Aborting America*. New York, Doubleday & Co Inc, 1979, pp 244-247.

11. Cates W Jr, Schulz KF, Grimes DA, et al: The effect of delay and choice of method on the risk of abortion morbidity. *Fam Plann Perspect* 1977;9:266-273.

12. Rohl LH, Sherwin R, Henderson MM: The impact of legal abortion: Redefining the maternal mortality rate. *Health Serv Rep* 1974;89:267-273.

13. Cates W Jr: Abortion myths and realities: Who is misleading whom? *Am J Obstet Gynecol* 1982;142:954-956.

14. McLean R, Mattison ET, Cochrane NE: Maternal mortality study: I. Annual report, 1970-1976. *NY State J Med* 1979;79:29-46.

Document #5

Mortality From Abortion and Childbirth

Are the Statistics Biased?

Willard Cates, Jr, MD, MPH; Jack C. Smith, MS; Roger W. Rochat, MD; David A. Grimes, MD

• **Critics have challenged previous comparisons of mortality from legal abortion and childbirth for containing biases in the crude data that spuriously favor the safety of abortion. To evaluate this concern, we reviewed the sources of mortality data on which these comparisons are based and examined the completeness of abortion mortality statistics, the completeness of childbirth mortality statistics, and the accuracy of the denominators for both these events. We found the evidence to be consistent in two directions: (1) abortion deaths appear to be more completely ascertained than childbirth deaths; (2) use of different denominator estimates has relatively little impact on the comparison. From this evidence, we conclude that the crude data are biased in a direction that overestimates the abortion risks for the woman relative to the risks of childbearing.**

(*JAMA* 1982;248:192-196)

MILLIONS of women in the United States confront the choice between elective abortion and childbirth each year. The safety of these two options may influence this often difficult decision. Our previous reports on abortion mortality[1,2] have compared the risks of legal abortion and childbearing for 1972 through 1975; the risk of dying from childbirth was nearly fivefold higher than the risk of dying from abortion. Our companion article (p 188) updates these previous comparisons and demonstrates that the gap actually widened in the more recent years.

See also p 188.

However, these inferences have been challenged by some critics[3-7] who contend the crude statistics are biased in three ways that spuriously favor the safety of legal abortion over childbearing. They argue that (1) social stigma is involved in abortion, which causes deaths from abortion to be misclassified more frequently—and thus undercounted—than deaths from childbearing; (2) deaths from causes unrelated to pregnancy (such as cancer, automobile accidents, or burns in pregnant women) are often classified as "maternal" deaths from childbearing—and thus overcounted; and (3) death-to-case rates artificially favor abortion because the count of legal abortions performed is too high, while the use of live births alone as a denominator for calculating the risk of childbearing is inappropriately low. They contend that if these biases are eliminated, "natural" pregnancy is safer than induced abortion.[3]

In this article we examine each of these alleged statistical biases. We first describe the sources of the data for abortion and childbearing in the United States between 1972 and 1978. We then address the three issues of bias themselves. From the available evidence, we conclude the current comparisons *are* biased—however, in the opposite direction to that alleged; they spuriously favor the safety of childbearing rather than abortion. Thus, the estimates of the relative safety of terminating a pregnancy by legal abortion compared to continuing a pregnancy to term appear conservative.

METHODS

Sources of Data

Three organizations provide primary data used in calculating the risks of dying from abortion or childbearing. The Centers for Disease Control (CDC) has conducted epidemiologic surveillance of abortion-related mortality since 1972[2] and has reported the number and characteristics of women obtaining legal abortion since 1969.[8] The National Center for Health Statistics (NCHS) publishes annual vital statistics information, including the number of deaths from abortion and childbearing and the number of live births.[9] The Alan Guttmacher Institute (AGI) has conducted an annual survey of all abortion providers since 1975 to deter-

From the Family Planning Evaluation Division, Center for Health Promotion and Education, Centers for Disease Control, Atlanta.

Reprint requests to the Family Planning Evaluation Division, Center for Health Promotion and Education, Centers for Disease Control, Atlanta, GA 30333 (Dr Grimes).

mine the number of abortions performed in the United States." Thus, there are two sources for data on abortion deaths (CDC, NCHS), two sources for the number of abortions (CDC, AGI), and one source for data on childbearing deaths and live births (NCHS).

The CDC identifies abortion deaths through a variety of mechanisms[11]: reports from state health departments to the CDC, case histories in medical journals, reports from abortion providers and anti-abortion organizations, state maternal mortality review committees, the Food and Drug Administration, pharmaceutical companies, malpractice insurance carriers, the Commission on Professional and Hospital Activities (CPHA), and the NCHS. After learning about a death, CDC staff members contact state health department investigators or attending physicians to verify and clarify the details of the case. We classify the abortion leading to the death as legal, illegal, spontaneous, or unknown, based on definitions developed by a committee of consultants outside of the CDC.[12]

Abortion and childbearing deaths reported by NCHS represent traditional vital statistics classifications dealing with underlying cause of death.[13] These classifications are based on criteria defined by the *International Classification of Diseases-Adapted* (*ICDA*) guidelines applied to all available information listed on the death certificate. Statistics from the death certificate produced only the underlying cause of death, not contributory causes. Moreover, vital statistics data are limited to the information provided on the death certificate; hence clinical details on each death that might exist on medical records are not available through vital statistics data.

The number of abortions reported to the CDC depends primarily on the number reported to the central health agencies in the 50 states and the District of Columbia.[3] Because different states have varying approaches to collecting abortion statistics, there is no unified national reporting of abortion data.[14] The AGI directly contacts all known abortion providers annually for abortion data.[15] This active surveillance by the AGI each year generates a total number of legal abortions approximately 15% to 20% higher than that reported to the CDC.

RESULTS

Completeness of Abortion Mortality Statistics

Although it is likely that the CDC has not identified all abortion deaths in the United States since 1972, every reported death has been counted in CDC statistics. Moreover, these data appear remarkably complete. Several parallel findings support this inference: comparison of surveillance data with vital statistics data, similarities of death-to-case rates with other reports, failure of intensive record linkage studies to uncover an appreciable number of new deaths, and the inability of critics to provide any additional deaths.

Table 1.—Abortion-Related Deaths in the United States Reported to the CDC and the NCHS, 1972 Through 1978*

Year	Total Abortion Deaths by Source		Legal Abortion Deaths by Source	
	CDC†	NCHS‡	CDC†	NCHS‡
1972	90	70	24	10
1973	57	36	26	8
1974	54	27	25	6
1975	49	27	29	10
1976	27	16	11	1
1977	36	20	17	6
1978	27	16	7	2
Total	339	212	138	43

*CDC indicates Centers for Disease Control; NCHS, National Center for Health Statistics.

†Centers for Disease Control epidemiologic surveillance of abortion-related deaths, 1972 through 1978; numbers updated as reports received.

‡National Center for Health Statistics annual mortality summary.[3]

Each year since the CDC began its surveillance of abortion mortality, it has reported more deaths as abortion related than are recorded in the national vital statistics.[11] Between 1972 and 1978, the CDC counted 339 abortion-related deaths, 60% more than the 212 reported through national vital statistics (Table 1). Moreover, because surveillance techniques resolved more deaths into the specific categories of abortion (legal, illegal, spontaneous), the magnitude of the difference between the CDC and the NCHS was exaggerated for legal abortion deaths (Table 1). During the seven years from 1972 through 1978, the CDC reported 138 deaths after legal abortion compared with 43 reported in vital statistics, or over 200% more. The reason why legal abortion deaths were undercounted by the NCHS to a greater extent than total abortion deaths was due to inadequate information provided on the death certificate to allow specific classification. Most abortion deaths reported by NCHS are listed as "unspecified."[3]

Although the number of deaths reported by the CDC is higher than that of the NCHS, it may also reflect an undercount of the true number of total deaths. To determine the degree of underreporting of abortion deaths by the CDC, we used an epidemiologic approach that compares data from two sources to estimate the total number of events.[16] By matching deaths from both the NCHS and CDC files, we estimated that the CDC ascertained more than 90% of all abortion deaths.[11] Also, it appears that the surveillance system is becoming more complete the longer it is in existence.[11]

Death-to-case rates for legal abortion reported by the CDC are consistent with those reported from other investigations. To obtain complete information on all deaths after abortion performed in New York State between 1970 and 1972, physicians throughout the United States were canvassed by the CDC to determine abortion-related deaths among both residents and nonresidents[17]; the death-to-case rate during these years was 6.5 deaths per 100,000 abortions. In California between 1970 and 1972, the death-to-case rate for legal abortion was 5.1 deaths per 100,000 abortions.[18] After allowing for changes in gestational age, abortion methods, and increasing physician experience, all of which would make the procedure safer, these figures are similar to the 4.1 deaths per 100,000 abortions in the United States reported by the CDC in 1972.

A similar mortality risk has been reported from other countries.[19] National registries in England and Wales, Canada, Cuba, Czechoslovakia, Denmark, Hungary, Sweden, and Yugoslavia—countries where the quality and completeness of health data are high—have also reported death-to-case rates for abortion comparable with those in the United States. The consistency of these domestic and international studies lends support to the inference that abortion-related mortality is not being undercounted in the United States.

Investigations using extensive tracing techniques to uncover additional pregnancy-related deaths have identified few unreported abortion fatalities. In Georgia,[20] computerized

record linkage of both abortion and death certificates failed to uncover any deaths for which legally induced abortion could be causally related. In New Jersey[17] and Puerto Rico,[20] improved surveillance of maternal mortality using hospital records and death certificates identified deaths after spontaneous or illegally induced abortion, but not after legally induced abortion. Review of all deaths in CPHA hospitals during 1977 and 1978 identified two previously unreported deaths related to legal abortion (CDC, unpublished data); both situations involved procedures undertaken for therapeutic reasons. Thus, even intense searches through large data bases have led to few unreported deaths after legal abortion.

Finally, individuals and groups that allege the incompleteness of abortion mortality statistics have not, to date, been able to produce any new abortion-related deaths of which the CDC was previously unaware during the seven-year period for which the CDC has published data. In 1973, on national television, Tietze[11] offered $100 to any person who would identify an abortion death that was unreported to the CDC; this offer has been restated many times, and the stakes were raised to $150 in 1977. Yet, to date, all attempts to claim the "bounty" have produced only deaths that already had been reported to the CDC. Moreover, despite assertions[4] that an investigation of abortion clinics in Chicago uncovered 12 "unknown" abortion-related deaths, only one had not been previously identified by the CDC.

The available scientific literature strongly supports the quality and completeness of current data on abortion mortality. Surveillance techniques have apparently been successful in identifying and classifying most deaths from legal abortion.

Completeness of Childbirth Mortality Statistics

Despite assertions that childbirth-related deaths are overcounted because they include deaths to pregnant women from causes unrelated to pregnancy, the available studies of vital statistics show just the opposite. Using death certificate data and standard maternal mortality nosological classification criteria, deaths directly attributable to continuing pregnancies to term are markedly *undercounted* (Table 2). Investigations from state and international maternal mortality review committees,[19,21-23] state record linkage studies,[20,24] and a national death certificate review[25] all point in the same direction—pregnancy-related deaths from vital record sources, interpreted by the rules of the *ICDA-8*, are greatly undercounted (Table 2).

In Minnesota in the early 1950s,[21] the number of maternal deaths was increased 18% through linkage of death and live birth certificates, and an additional 20% by using case reports encouraged through the efforts of a vigorous maternal mortality review committee. In Massachusetts during the same period,[22] active contact with physicians by the maternal mortality review committee led to identification of 73% more pregnancy-related deaths than reported by state vital records.

More recent state-based investigations document similar findings. In New Jersey in 1974-1975, use of hospital maternal service records and medical examiner reports detected 45% more direct pregnancy-related deaths than death certificates alone.[17] In Georgia in 1975-1976, record linkage of deaths and births found 50% more childbirth-related deaths.[24] Finally, in Puerto Rico in 1978-1979, the discrepancy was even more striking.[20] Re-

Table 2.—Reporting of Pregnancy-Related Deaths Through Vital Statistics

Location and Years of Study	Source of Comparison Data	No. of Deaths: Official Vital Statistics	No. of Deaths: Additional Deaths	% Increase*
Minnesota, 1950-1954 (from Barno et al[21])	Record linkage	204	37	18
	Active surveillance	...	41	20
Massachusetts, 1954 (from Jewett[22])	Active surveillance	37	27	73
New Jersey, 1974-1975 (from Ziskin et al[17])	Active surveillance	11	5	45
Georgia, 1975-1976 (from Rubin et al[24])	Record linkage	24	12	50
Puerto Rico, 1978-1979 (from Speckhard[20])	Death certificate review	9	13	144
	Hospital record review	...	32	356
United States, 1974-1978 (from Smith et al[25])	Death certificate review and additional information from states	1,745	576	33
		...	171	10
England, 1970-1972 (from Arthure et al[23])	Active surveillance	355	251	71

*Percent increase indicates the number of additional deaths divided by the number of deaths identified by official vital statistics.

Table 3.—Death-to-Case Rate for Legal Abortion, by Year and Source, 1972 Through 1978

Year	Deaths*	Abortions† CDC	Abortions† AGI	Death-to-Case Rates‡ CDC	Death-to-Case Rates‡ AGI
1972	24	587,000	(587,000)§	4.1	...
1973	25	616,000	746,000	4.1	3.4
1974	25	763,000	899,000	3.2	2.8
1975	29	855,000	1,034,000	3.4	2.8
1976	11	988,000	1,179,000	1.1	0.9
1977	17	1,079,000	1,317,000	1.6	1.3
1978	7	1,168,000	1,410,000	0.6	0.5
Total	138	6,047,000	7,170,000	2.3	1.9

*Centers for Disease Control epidemiologic surveillance of abortion-related deaths, excluding deaths after ectopic pregnancy.

†CDC indicates Centers for Disease Control; AGI, Alan Guttmacher Institute. Specific numbers may not add to total due to rounding.

‡Deaths per 100,000 abortions.

§The AGI did not conduct a survey of abortion providers in 1972; thus, CDC numbers are used for estimation.

Table 4.—Death-to-Case Rate for Childbirth, by Year and Adjustment of Denominator Data, 1972 Through 1978

Year	Deaths*	Reported Live Births	Estimated Molar Pregnancies and Fetal Deaths†	Death-to-Case Rates‡	
				Live Births Only	Live Births, Molar Pregnancies, Fetal Deaths
1972	494	3,258,000	44,900	15.2	15.0
1973	396	3,137,000	42,000	12.6	12.4
1974	383	3,160,000	41,200	12.1	12.0
1975	328	3,144,000	37,800	10.4	10.2
1976	333	3,168,000	37,600	10.5	10.4
1977	309	3,327,000	37,600	9.3	9.2
1978	268	3,333,000	37,500	8.0	8.0
Total	2,508	22,527,000	278,600	11.1	11.0

*National Center for Health Statistics annual vital statistics, excludes death from abortion and ectopic pregnancies.

†Estimated from reported number of fetal deaths[9] and estimated number of molar pregnancies.[10]

‡Deaths per 100,000 live births or per 100,000 live births, molar pregnancies, and fetal deaths combined.

viewing all death certificates for pregnancy-related conditions identified nearly 1½ times more maternal deaths than reported through vital statistics. Further examination of hospital records for women dying with high-risk conditions found even more pregnancy-related deaths than by death certificate scanning. Thus, in Puerto Rico, the number of deaths reported by vital statistics was only 15% of the total. While the Puerto Rican experience may not be representative of the situation in other states, the New Jersey and Georgia data probably reflect what is happening in other areas.

National data, both in the United States and England, support the conclusions from the more circumscribed investigations. Intensive examination of death certificate and other information from 1974 through 1978 provided by 48 states and the District of Columbia identified an additional 33% more pregnancy-related deaths than reported by national vital statistics.[23] Nosological classification requirements due to *ICDA-8* accounted for 11% of the discrepancy, while additional data provided by maternal mortality review committees or state health departments added another 22%. Experience with maternal mortality in England and Wales determined that use of death certificates alone undercounts childbirth-related deaths by 71%.[22]

Thus, use of vital statistics data apparently underreports the true number of childbirth deaths, by a factor of at least one third. Unlike abortion deaths, where surveillance techniques have supplemented vital statistics information in recent years, national childbirth mortality statistics are limited by their reliance on both death certificate diagnoses alone and rigid priorities for nosological classification.

Accuracy of Denominators

Comparing the risk of dying from either legal abortion or childbearing involves not only the accuracy of the respective numerators but also, to a lesser degree, the accuracy of the denominators. For death-to-case rates from legal abortion, the denominator is the number of procedures performed. For the risks of childbearing events, the denominator is live births. Overcounting the denominator of abortions performed or undercounting the denominator of total childbearing events would spuriously underestimate the relative risk of dying from abortion compared to childbirth.

Some have alleged that because the AGI is a family planning research organization, their estimate of the total number of abortions may be too high; thus, use of their numbers as denominators to calculate death-to-case rates for legal abortion results in an artificially low rate. Some critics believe that mandatory reporting of legal abortions required by some states is more accurate than direct surveys of those providing health services. However, experience with surveillance of infectious diseases[24-26] demonstrates the opposite. In public health surveillance, though reporting of certain communicable diseases is mandatory, the number of cases reported through passive techniques is usually far less than those identified by more direct active approaches, such as that used by the AGI.

Counting the number of legal abortions is probably no different. Experience in Hawaii[27] and Tennessee[28] indicates passive reporting requirements primarily miss abortions performed in nonhospital facilities. Thus, the number of legal abortions reported to central health agencies, and eventually tabulated by the CDC, is probably less than the actual number performed. The number of abortions obtained by the AGI's survey is higher. While one cannot rule out possible overreporting to the AGI, even the AGI figure itself may be too low.[29] Regardless of whether AGI or CDC numbers are used as denominators to calculate death-to-case rates for abortion, the effect is quite small (Table 3). Between 1972 and 1978, using AGI denominators, the death-to-case rate for legal abortion was 1.9 deaths per 100,000 abortions; using CDC denominators, it was 2.3.

The use of live births alone as denominators for childbearing events has been criticized,[3] since it neglects other pregnancy-related events—such as ectopic pregnancy, molar pregnancy, or fetal death in utero—that have potentially fatal outcomes for the pregnant woman. Thus, by including such events in the numerator (all deaths from childbearing), but not in the denominator (restricted to live births), critics[3] allege that the childbearing mortality rate is artificially elevated. While this concern is hypothetically correct, in practice it makes relatively little difference. First, current investigations[3] comparing abortion and childbearing mortality have subtracted from the numerator of childbearing deaths all deaths from abortion and ectopic pregnancy; thus, there is no need to include them in the denominator. Second, compared with the number of live births, the number of fetal deaths and molar pregnancies is almost negligible (Table 4); these accounted for less than 2% of all childbearing events in recent years.[9,10,23]

Thus, claims that inaccuracies in the denominators used to calculate mortality rates for either legal abortion or childbearing artificially favor legal abortion are overstated. Even using the smaller CDC denominator for reported legal abortions (Table 3) and the larger denominator for childbearing to include stillbirths and molar pregnancies (Table 4), between 1972 and 1978 the comparative death-to-case rates are about fivefold higher for childbearing.

CONCLUSION

Examination of the data on which mortality rates for legally induced abortion and childbearing are calculated indicates the comparisons overestimate the abortion risks. In terms of dying, abortion through the 15th week of pregnancy is at least tenfold safer than childbearing. "Natural pregnancy"' is not safer for the woman than induced abortion.

References

1. Cates W Jr, Grimes DA, Smith JC, et al: Legal abortion mortality in the United States: Epidemiologic surveillance, 1972-1974. *JAMA* 1977;237:452-455.

2. Cates W Jr, Tietze C: Standardised mortality rates associated with legal abortion: United States, 1972-1975. *Fam Plann Perspect* 1978; 10:109-112.

3. Hilgers TW, O'Hare D: Abortion related maternal mortality: An in-depth analysis, in Hilgers TW, Horan DJ, Mall D (eds): *New Perspectives in Human Abortion.* Frederick, Md, Aletheia Books, University Publications of America Inc, 1981, pp 69-91.

4. Adamek RJ: Abortion policy: Time for reassessment, in Burtchaell JT (ed): *Abortion Parley.* Kansas City, Mo, Andrews & McMeel Inc, 1979, pp 1-26.

5. Testimony of T. W. Hilgers, given before the Royal Commission on Human Relationships, May 21, 1975, Sydney, Australia, reprinted in *Hearings Before the Subcommittee on Constitutional Amendments of the Senate Subcommittee on the Judiciary,* 94th Cong, 1st sess, post IV, 1975, p 724.

6. Willke JC, Willke B: *Handbook on Abortion.* Cincinnati, Hayes Publishing Co, 1975, pp 79-90.

7. Hilgers TW: The medical hazards of legally induced abortion, in Hilgers TW, Horan DJ (eds): *Abortion and Social Justice.* New York, Sheed & Ward, 1972, pp 57-88.

8. *Abortion Surveillance 1978,* US Dept of Health and Human Services publication 80-8276. Atlanta, Centers for Disease Control, November 1980.

9. *Vital Statistics of the United States,* National Center for Health Statistics. Government Printing Office, 1974-1981, vol 2: *Mortality.*

10. Henshaw S, Forrest JD, Sullivan E, et al: Abortion in the United States, 1978-1979. *Fam Plann Perspect* 1981;13:6-18.

11. Cates W Jr, Smith JC, Rochat RW, et al: Assessment of surveillance and vital statistics data for monitoring abortion mortality. United States, 1972-1975. *Am J Epidemiol* 1978;108:200-206.

12. *Administrative Guidelines for Investigating Abortion Deaths.* Atlanta, Centers for Disease Control, 1981.

13. *Eighth Revision of International Classification of Diseases, Adapted for Use in the United States.* Washington, DC, National Center for Health Statistics, 1967.

14. Smith JC: The complexity of compiling abortion statistics. *Public Health Rep* 1975; 90:502-503.

15. Berger GS, Tietze C, Pakter J, et al: Maternal mortality associated with legal abortion in New York State: July 1, 1970-June 30, 1972. *Obstet Gynecol* 1974;43:315-326.

16. Stewart GK, Hance F: Legal abortion: Influences upon mortality, morbidity, and population. *Adv Planned Parenthood* 1974;9:1-7.

17. Tietze C: *Induced Abortion: A Worldwide Review.* New York, The Population Council, 1981, pp 91-95.

18. Shelton J, Schoenbucher AK: Deaths after legally induced abortion. *Public Health Rep* 1978;93:375-378.

19. Ziskin LZ, Gregory M, Kreitzer M: Improved surveillance of maternal deaths. *Int J Gynaecol Obstet* 1979;16:281-286.

20. Speckhard ME: Maternal mortality surveillance in Puerto Rico. Presented at the 30th Annual Epidemic Intelligence Service Conference, Centers for Disease Control, Atlanta, April 25, 1981.

21. Barno A, Freeman DW, Bellville TP: Minnesota Maternal Mortality Study, five-year general summary, 1950-1954. *Obstet Gynecol* 1957; 9:336-344.

22. Jewett JF: Changing maternal mortality in Massachusetts. *N Engl J Med* 1957;256:396-399.

23. Arthure H, Tomkinson J, Organe G, et al: *Report on Confidential Enquiries Into Maternal Deaths in England and Wales, 1970-72.* London, Her Majesty's Stationery Office, 1975, pp 122-123.

24. Rubin G, McCarthy B, Shelton J, et al: The risk of childbearing re-evaluated. *Am J Public Health* 1981;71:712-716.

25. Smith JC, Pekow P, Maze J, et al: Maternal mortality study, 1974-1978. Presented at the Annual Meeting of the Association of Vital Records and Health Statistics, Portland, Me, July 31, 1981.

26. Cases of specified notifiable diseases: United States. *MMWR* 1975;24:405-407.

27. Levy BS, Mature J, Washburn JW: Intensive hepatitis surveillance in Minnesota: Methods and results. *Am J Epidemiol* 1977;105:127-134.

28. Marier R: The reporting of communicable diseases. *Am J Epidemiol* 1977;105:587-590.

29. Chung CS, Steinhoff PG, Mi M-P, et al: Completeness and accuracy of reporting induced abortions performed in Hawaii's hospitals, 1970-1974. *Public Health Rep* 1979;94:454-458.

30. Atrash HK, Allen DT, Rochat RW: Legal abortions in Tennessee, 1974-1978. *J Tenn Med Assoc* 1980;73:855-863.

31. Cohen BA, Burkman RT, Rosenshein NB, et al: Gestational trophoblastic disease within an elective abortion population. *Am J Obstet Gynecol* 1979;135:452-454.

32. Hayashi K, Bracken MB, Freeman DH Jr, et al: Hydatidiform mole in the United States (1970-1977): A statistical and theoretical analysis. *Am J Epidemiol* 1982;115:67-77.

Document #6

ABORTION 1977-1979

NEED & SERVICES IN THE UNITED STATES, EACH STATE & METROPOLITAN AREA

By Stanley K. Henshaw, Ph.D., Senior Research Associate, The Alan Guttmacher Institute,
Jacqueline Darroch Forrest, Ph.D., Director of Research, The Alan Guttmacher Institute,
Ellen Sullivan, Research Associate, The Alan Guttmacher Institute
and Christopher Tietze, M.D., Senior Consultant, The Population Council

A REPORT OF THE ALAN GUTTMACHER INSTITUTE
A Corporation for Research, Policy Analysis and Public Education
360 Park Avenue South, New York, N.Y. 10010

Summary of Findings

There were 1,409,600 abortions reported in the United States in 1978, and a projected 1,540,000 occurred in 1979 (see Table A). The number of abortions increased by seven percent between 1977 and 1978 and by nine percent between 1978 and 1979.

In 1978, 2.8 percent of women of reproductive age obtained legal abortions, and 29.4 percent of women who were pregnant (excluding those who experienced miscarriages or stillbirths) chose to terminate those pregnancies by abortion. In 1979, 3.0 percent of women of reproductive age obtained legal abortions, and 30.3 percent of pregnant women obtained abortions.* Nevertheless, almost as many women carried unintended pregnancies to term as obtained abortions. Three factors appear to be contributing to the continuing increase in the abortion rate: Abortion services are gradually becoming accessible to more women, a larger proportion of women with unintended pregnancies are choosing to resolve the pregnancies by abortion, and the number of unintended pregnancies may be increasing due to shifts from the pill and IUD to less effective methods and rising sexual activity rates among unmarried women.

About one in three abortions in 1978 was obtained by a teenager; three in four, by unmarried women; and two in three, by white women. Six in 10 abortions were obtained by women who had no children, and seven in 10, by women who had had no prior abortions. The proportion of abortions accounted for by unmarried and nonwhite women declined slightly between 1977 and 1978, probably because the federal government and most states severely restricted Medicaid abortion funds. The abortion rate among women over 40 years old fell slightly in 1978, possibly reflecting greater use of contraceptive sterilization by women in this age group.

Nine percent of abortions in 1978 were performed after the first 12 weeks of pregnancy — down one percentage point from 1976 but about the same percentage as in 1977. A higher percentage of abortions were performed by instrumental evacuation (aspiration or, much less often, sharp curettage), the safest methods, in 1978 (95 percent) than in 1977 (94 percent), probably because more second-trimester abortions were performed using dilatation and evacuation in preference to saline or prostaglandin instillation. Two-thirds of all abortions performed after 12 weeks occurred in hospitals.

Abortions were performed in a total of 2,753 facilities in 1978, a net increase of only two percent over the previous year. Large facilities reporting 5,000 or more procedures in 1978 accounted for 20 percent of all abortions. There were 38 such facilities — 34 clinics and four hospitals.

---

*Excluding miscarriages and stillbirths. Including an estimate of the number of miscarriages and stillbirths, approximately 25.9 percent of pregnancies were terminated by abortion in 1979.

The number of hospitals offering abortion services fell slightly between 1977 and 1978, from 1,654 to 1,626, but the number of nonhospital providers (clinics and physicians' offices) increased from 1,034 to 1,127. The number of abortions performed in the average hospital facility also decreased, from 237 to 216, while the average caseload of nonhospital facilities rose from 895 to 940. As a result of these two factors, the percentage of legal abortions performed in hospitals declined from 30 percent in 1977 to 25 percent in 1978. The decline in the proportion of abortions occurring in hospitals may be due to the lower cost of nonhospital abortions, the visibility and comprehensiveness of services available in large abortion clinics, and other factors. Abortions were performed in only 29 percent of general short-term non-Catholic hospitals — 18 percent of public hospitals and 36 percent of proprietary and voluntary hospitals.

Eight percent (a total of 113,000) of women obtaining abortions in 1978 had to cross state lines to do so, and a much larger proportion had to travel, often considerable distances, to get to the major cities in their states where most abortion facilities are located. However, geographical availability of abortion services has been gradually improving: nine percent of abortions in 1977, and even higher percentages in previous years, occurred outside the woman's state of residence. Services in the most poorly served states are expanding more rapidly than those in well-served states. The proportion of women of reproductive age living in a county with at least one abortion provider serving 400 or more women a year increased slightly from 54 percent in 1977 to 55 percent in 1978.

The need to travel long distances for abortion services is still a serious problem for many women, particularly for teenagers and low-income women, groups with relatively high rates of unintended pregnancy compared to other women. The fact that so many women travel long distances for abortion services suggests that there may also be others who would choose to have abortions but are unable to obtain them. In order to evaluate the availability of abortion services in specific geographic areas, an estimate has been made of the "need" for abortion services, that is, the number of women who would obtain abortions to terminate unwanted pregnancies if such services were readily available and accessible to them. The estimate of the number of women in need of abortion services is based on the actual behavior of residents of states with relatively good availability and accessibility of abortion services in 1978 — California, Connecticut, Hawaii, Nevada, and New York. The need estimate serves as a standard against which to measure the adequacy of abortion services in the United States. Thirty-four percent of women estimated to be in need of abortion services were unable to obtain them in 1978, and 29 percent could not get them in 1979.

Many women have been unable to obtain abortion services, in part, because of continued inaccessibility of abortion facilities: 77 percent of U.S. counties and 49 Standard Metropolitan Statistical Areas (SMSAs) had no facility in which legal abortions were performed in 1978. In states where the majority of women lived in counties without abortion facilities, a larger proportion of the women needing abortion services

went unserved than in states with more adequate services. Only five percent of abortions were performed in nonmetropolitan areas, where 26 percent of the women needing abortion services lived.

In addition, federal funds to subsidize abortions for indigent women have virtually been withdrawn as a result of the Hyde Amendment. Most states have followed suit, refusing state Medicaid funds for abortions, although a small number of large states continue to fund abortions for Medicaid recipients with state funds. Studies indicate that restrictions on Medicaid funding of abortions in 1978 probably compelled 18,000-30,000 women to have unintended births — births they would otherwise have averted by abortion.

I. Background

A majority of all pregnancies experienced by women in the United States are unintended — either not wanted until a later date or not wanted ever. It is estimated that of the 5,610,000 pregnancies in 1978, 3,095,000, or 55 percent, were unintended (see Table I-1). One out of every 16 women aged 15 to 44 experienced an unintended pregnancy in that year.

In spite of efforts to increase the availability of contraceptive services, the number and rate of unintended pregnancies appear to have increased in recent years.* A number of reasons have been suggested to account for the high and rising level of unintended pregnancy. First, a high proportion of unmarried teenagers, and presumably also of older unmarried women, have become sexually active in recent years. 1/ Unmarried women who are sexually active are unlikely to desire pregnancy but may be less effective contraceptors due to inexperience, intermittent patterns of sexual activity, attitudinal factors, and other reasons. Second, even the best reversible contraceptive methods have failure rates in actual use that result in many accidental pregnancies. According to data from the 1973 and 1976 National Surveys of Family Growth, 2.5 percent of married women using oral contraceptives experience accidental pregnancies during the first year of use, as do 4.8 percent of those using IUD's, 9.6 percent of those using condoms, and 14.4 percent of those using diaphragms. 2/ This means that a woman using the best reversible contraceptive methods nevertheless has a fair probability of becoming pregnant accidentally sometime during her reproductive years. Third, the perception of health risks associated with the pill and IUD has resulted in a shift to use of less effective reversible methods.** This shift, however, has been at least partly offset by an increase in use of sterilization 3/ and an overall increase in contraceptive practice. 4/

In 1978 about half the women faced with an unintended pregnancy terminated the pregnancy by abortion and half carried the pregnancy to term (see Table I-1, Panel 4). As a consequence, between mid-1978 and mid-1979, about 1,287,000 births resulted from unintended pregnancies (see Table I-1, Panel 1). This amounts to 38 percent of all births during this period. There is evidence (summarized in Section IV below) that many of the women who carried unintended pregnancies to term would have chosen to terminate these pregnancies by abortion if abortion services had been readily available to them.

The abortion rate is determined by the rate of unintended pregnancy and by the proportion of unintentionally pregnant women who have access to abortion services and utilize these services to resolve the pregnancy.

---

*Calculated from the numbers of abortions and special tabulations of the 1973 and 1976 National Surveys of Family Growth.

**Evidence for such a shift may be seen in the 1973 and 1976 National Surveys of Family Growth and in the Johns Hopkins Surveys of Young Women. See references 1 and 3.

IV. Need for Abortion Services

The unavailability of abortion services locally presents a serious problem for many women who might wish to resolve an unintended pregnancy by abortion. A long distance to the nearest provider may make it difficult for a woman to obtain information about the existence of the provider, the services offered, and their costs. Counseling by the trained staff of an abortion facility is unavailable until the woman has already invested time and money in travel. Distance adds significantly to the cost of an abortion due to travel, food and lodging expenses. It increases the time a woman must take from other activities to obtain the abortion, which may involve additional child-care expenses and, for a working woman, may result in lost income and other job problems. Confidentiality is jeopardized by the need to be away from home for a longer period of time -- possibly one or two nights rather than a few hours. The problems posed by distance are particularly severe for teenagers and low-income women, groups with relatively high need for abortion services.

For the women who succeed in overcoming these problems in obtaining abortions, distance has additional disadvantages. From a medical viewpoint, a long distance is undesirable because the time spent making travel arrangements may delay the abortion to a later, less safe period of gestation. There is increased likelihood that a woman will be unable to return for a followup examination, and the abortion facility will be unavailable to treat complications that may occur after the patient returns home. Extensive travel immediately after an abortion procedure may not be helpful to recuperation.

While some women are able to overcome the barriers of distance to obtain abortion services, others carry unintended pregnancies to term when abortion services are unavailable locally. A study of abortion rates in Georgia counties has shown that abortion rates rise sharply when services become available in previously unserved areas.7/ This study also found that abortion rates in rural counties were as affected by increased availability as were the rates in urban areas. These results suggest that the low abortion rates observed in many rural areas are due, at least in part, to lack of abortion services, not just to differing values and preferences of rural people.

In order to assess the adequacy of abortion services, it is important to measure the extent to which the services available in specific geographic areas are able to meet the needs of local residents. For this purpose, it is helpful to estimate the number of women in each area who might be expected to want and seek abortions in a given year, that is, the number of women who have unintended pregnancies and would choose to terminate their pregnancies by abortion if abortion services were readily available.

It is possible to estimate the expected need, or potential demand, for abortion services for a given area by using as a standard the experience of areas with good abortion service availability. Since abortion

utilization varies greatly by age and race, it is important to take into account the age and race distribution of the population of a geographic area when estimating its need for abortion services.

In previous reports, various standards have been used to estimate the need for abortion services based on data available at the time. 8/ For 1973 through 1975 two estimates were made, one based on the abortion experience of California in 1973 and one based on that of New York City residents in 1971. Since that time, better information on use of abortion services has become available in other states, and more states have come to have relatively adequate abortion services. Need estimates for 1976 and 1977 were based on the six states with the highest resident abortion rates in 1976 — Washington, Massachusetts, New Jersey, Maryland, New York and California. The age-specific and race-specific abortion rates calculated on an aggregate basis for these states for 1976 were applied to estimates of the U.S. female population, to yield 1,791,000 women in need of abortion services in 1976. The expected abortion rate if all need were met was 37.2 abortions per 1,000 women of reproductive age. This estimate was regarded as conservative since access to abortion services was far from universal even in the criterion states.

Since 1976, abortion services have become more available and abortion rates have continued to rise even in relatively well-served states. By 1978 five states had relatively adequate abortion services; in these states at least 80 percent of women aged 15-44 lived in counties with one or more facilities providing 400 or more abortions a year. These five states, California, Connecticut, Hawaii, Nevada and New York, were taken as the criterion states for assessing the adequacy of abortion services in 1978. The two most populous of the states, California and New York, were also among the states used as a standard in estimating abortion services need in 1976.

The aggregate resident abortion rate of the five states was 42.9 abortions per 1,000 women of reproductive age in 1978. It is assumed that if abortion services were as readily available throughout the country as they were to women living in those states in 1978, women throughout the country would also have abortions at about the rate of 42.9 per 1,000. On this assumption, the number of women in need of abortion services in 1978 was 2,146,100.* Due to population growth, the number in 1979 was slightly greater at 2,181,000. Since the number of reported abortions in 1978 was 1,409,600, there were an estimated 736,500

---

* Since the age and race distributions of women obtaining abortions were unavailable for most of the criterion states, and since the age/race distribution of the female population in these states was similar to that for the country as a whole, the aggregate abortion rate in the criterion states (42.9) was applied directly to the U.S. population of women 15-44 to arrive at the number of women estimated to have needed abortion services in 1978.

women who did not obtain abortions, but would have done so if abortion services had been readily available. "Readily available" in this context refers to the absence of economic, legal, and other barriers to service as well as to geographic accessibility.

The estimate of need does not assume that all women with unintended pregnancies would choose to have abortions if services were available. Some women who had unintended pregnancies would come to want to have the baby, and others simply would not have an abortion even to terminate an unwanted pregnancy for personal, moral or religious reasons. As was shown earlier, there were 2,697,000 unintended pregnancies that terminated in either live births or abortions in 1978. If all the women estimated to have been in need of abortion services had in fact had abortions, there would still have been approximately 612,000 births resulting from unplanned pregnancies.

In estimating the need for abortion services for states and other geographic areas, the age and race composition of the population of each area has been taken into account. The age- and race-specific expected abortion rates, based on the age-race distribution of women obtaining abortions for the country as a whole, are as follows*:

	Expected abortions per 1,000 women	
Age	White	Nonwhite
15-19	55.2	109.1
20-24	59.9	149.8
25-44	18.9	63.4

When these rates are applied to the population of a particular state, the resulting overall expected abortion rate (the rate expected if all women estimated to need abortion services were able to obtain them) may be higher or lower than the overall rate of 42.9 for the country as a whole. For example, the expected rate for Vermont is 35.5 abortions per 1,000 women of reproductive age because of its low nonwhite population, while that for Mississippi is 60 percent higher at 57.4 due to the large proportion of nonwhites in that state. Similarly, an area with a high proportion of women in the younger age groups (under 25) would have a higher expected abortion rate than one whose women were older on the average.

* To calculate the age-race specific rates, the 2,146,100 women in need of abortion services were distributed to age-race groups in the same proportions as all 1978 abortions, as estimated by AGI based on CDC data. Rates were then calculated by dividing the estimated number of women in need in each age-race group by the U.S. female population in that group.

The need estimates do not indicate exactly the number of women in a given area in need of abortion services in a given year. They would be more accurate if additional variables such as income level and marital status could be taken into account. The population estimates on which they are based are subject to a degree of error, especially in areas with small populations, due to the length of time since the 1970 census. Nevertheless, the need figures are reasonable estimates of the general levels of abortion services required, based on available data on women's behavior under conditions of relatively wide service availability.

V. Availability of Abortion Services

How much of the need for services was met?

Estimates of the need for abortion services indicate the potential demand for abortions, i.e., the number of women who experience unintended pregnancies and who would use abortion services if they were available. The unmet need for abortion services is the difference between the estimated need and the number of abortions which occur. The purpose of the need estimates is to identify those areas where services are most lacking and to assist planners to develop priorities for future abortion service development.

In 1978, an estimated 2,146,000 women were in need of abortion services. The 1,410,000 abortions which took place in 1978 was 66 percent of this level. Nationally, 736,000 women were unable to obtain the abortion services they needed. Among the women who did obtain abortions, 113,000 traveled outside their home states to do so, and many other women traveled within their state but outside their home communities for abortion services (see Table V-1).

Overall, the percentage of women in need of abortion services who were able to obtain them varied greatly both within and between states. In some states, namely California, Nevada, New York, Washington and the District of Columbia, a combination of in-state and out-of-state services provided for almost all the residents in need of abortion services. In other states, including Alabama, Arkansas, Idaho, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Nebraska, North Carolina, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Utah, West Virginia and Wisconsin, less than half of the need for abortion services was met. In four states, Illinois, Ohio, Pennsylvania, and Texas, more than 40,000 women in need of services were unable to obtain abortions.

In two census divisions of the country, Mid-Atlantic and Pacific, over 80 percent of the residents estimated to be in need of abortion services obtained abortions. In the West North Central and East South Central divisions, however, less than half of the services need was met. The East North Central division had the largest number of women, about 170,000, who were unable to obtain needed abortion services.

Estimates of the proportion of the abortion services need met and unmet at the substate level (SMSA* and county) have also been made. These estimates, however, have to be interpreted carefully because abortions are reported by where they occur and need is estimated on the basis of where women reside. Therefore, the provision of services may look unrealistically favorable in those areas to which women travel for abortions and may look overly unfavorable in those areas from which they travel. Table 1 in the Detailed Tables section compares the number of abortions reported to have occurred in each SMSA and in the remaining nonmetropolitan areas of each state in 1978 with the estimated number of women in need of abortion services.

---

* Standard Metropolitan Statistical Area.

Table V-1. Estimated number of women in need of abortion services, number of abortions, unmet need and percentage of need met to residents in their home state and other states, and to residents in their home state, 1978

Census division and state	No. of women in need of abortion services	Abortions to residents (in state and out of state)	Unmet need	% of need met (in state and out of state)	No. of abortions to residents in their home state	Need not met within state	% of need met in woman's home state
U.S. total	2,146,090	1,409,600	736,490	66	1,296,640	849,450	60
New England	104,790	79,350	25,440	76	72,950	31,840	70
Mid-Atlantic	352,160	294,940	57,220	84	278,120	74,040	79
E. North Central	391,160	221,430	169,710	57	203,470	187,690	52
W. North Central	146,180	61,610	84,570	42	48,360	97,820	33
South Atlantic	393,550	235,110	158,440	60	201,830	191,720	51
E. South Central	149,380	56,920	92,460	38	46,220	103,160	31
W. South Central	226,550	113,190	113,360	50	109,160	117,390	48
Mountain	98,190	56,960	41,230	58	50,900	47,290	52
Pacific	284,130	290,070	†	†	285,630	†	†
Alabama	43,070	16,310	26,360	38	13,770	29,300	32
Alaska	3,210	3,110	2,100	60	2,580	2,630	50
Arizona	24,100	13,650	10,450	57	13,080	11,020	54
Arkansas	22,760	6,930	15,830	30	4,930	17,830	22
California	213,820	232,700	†	†	231,470	†	†
Colorado	25,940	18,480	7,460	71	18,020	7,920	69
Connecticut	26,590	20,040	6,550	75	17,660	8,930	66
Delaware	6,330	4,270	2,060	67	3,170	3,160	50
D.C.	13,760	14,680	†	†	14,280	†	†
Florida	87,030	56,460	30,570	65	56,010	31,020	64
Georgia	61,880	34,950	26,930	56	31,370	30,310	51
Hawaii*	14,630	6,870	7,760	47	6,850	7,780	47
Idaho	7,400	2,650	4,750	36	1,680	5,720	23
Illinois	112,740	70,230	42,490	62	65,220	47,320	58
Indiana	47,700	24,650	23,050	52	15,030	32,670	32
Iowa	22,790	8,920	13,870	39	6,220	16,570	27
Kansas	19,790	8,630	11,160	44	7,750	12,040	39
Kentucky	31,380	12,910	18,670	41	10,350	21,230	33
Louisiana	48,680	12,970	35,710	27	12,280	36,400	25
Maine	8,850	5,420	3,430	61	5,040	3,810	57
Maryland	48,890	38,230	10,660	78	24,800	24,090	51
Massachusetts	51,270	40,760	10,510	80	39,840	11,430	78
Michigan	91,170	53,870	37,300	59	52,700	38,470	58
Minnesota	33,010	15,300	17,710	46	14,820	18,190	45
Mississippi	31,270	8,080	23,190	26	3,710	27,560	12
Missouri	44,730	20,180	24,550	45	13,190	31,540	29
Montana	7,050	3,720	3,330	53	2,980	4,070	42
Nebraska	13,580	5,000	8,580	37	4,630	8,950	34
Nevada	6,130	6,180	†	†	5,210	920	85
New Hampshire	6,650	4,520	2,130	68	3,650	3,000	55
New Jersey	70,350	57,640	12,910	82	46,630	23,900	66
New Mexico	12,350	6,590	5,760	53	5,910	6,440	48
New York	176,520	174,650	1,870	99	172,830	3,690	98
North Carolina	64,720	30,310	34,210	47	28,580	36,140	44
North Dakota	6,010	1,410	4,600	23	890	5,120	15
Ohio	100,070	56,170	43,900	56	54,170	45,900	54
Oklahoma	25,920	10,300	15,620	41	9,920	16,000	38
Oregon	19,800	13,950	3,850	81	13,860	5,940	70
Pennsylvania	105,090	62,630	42,440	60	58,640	46,450	56
Rhode Island	7,360	5,350	2,210	71	4,200	3,360	56
South Carolina	37,990	15,340	22,630	40	12,700	25,290	33
South Dakota	6,270	2,170	4,100	35	860	5,410	14
Tennessee	43,460	19,420	24,040	45	18,390	25,070	42
Texas	129,190	82,790	46,400	64	82,030	47,160	63
Utah	11,470	3,650	7,820	32	2,970	8,500	26
Vermont	3,870	3,260	610	84	2,560	1,310	66
Virginia	57,770	34,500	23,270	60	28,320	29,450	49
Washington	30,670	31,440	†	†	30,370	†	†
West Virginia	15,180	6,170	9,010	41	2,400	12,780	16
Wisconsin	39,480	16,310	22,970	42	16,350	23,130	41
Wyoming	3,750	2,040	1,710	54	1,050	2,700	28

† The number of abortions was equal to or exceeded the estimated number of women in need.

* The need for abortion services in Hawaii may be overestimated due to the classification of women of Hawaiian and Oriental descent as nonwhite.

Note: Numbers may not add to totals because of rounding.

Abortion services are much more readily available in metropolitan areas than in nonmetropolitan counties, and among the metropolitan areas, those with the largest populations are most likely to provide abortion services that equal or exceed the estimated number of residents expected to need these services (see Table V-2). For example, eight of the 13 SMSAs with more than 500,000 women aged 15-44 report abortions at least equal to the need. In these SMSAs collectively, 13,060 more abortions took place than the estimated number of resident women in need. These figures illustrate the fact that many women from surrounding areas look to the large urban areas for their abortion services. By way of contrast, only 10 percent of the smallest SMSAs — those with fewer than 100,000 women aged 15-44 -- reported a number of abortions equal to the estimated need for abortion services. In the smallest SMSAs collectively, 48 percent of the abortion services need was met.

Table V-3 lists the 49 SMSAs with no identified abortion provider and the four SMSAs in which providers were identified but served less than one percent of the estimated number of women in need. These 53 areas contained between 660 (Sherman, Texas) and 4,360 (Shreveport, Louisiana) women in need of abortion services, and in total they contained 84,240 women whose need for abortion services is not met. Some of the residents of these areas needing abortion services may have obtained them elsewhere, but many did not. New abortion facilities would undoubtedly find that services in these metropolitan areas would be utilized. In addition, there were 48 other SMSAs where at least one percent of the need was met but where 2,000 or more women remained unserved. Texas had the most unserved SMSAs with 10 (see Table V-3). Louisiana and Ohio each had five unserved SMSAs.

Abortion services were also in short supply in the nonmetropolitan areas of the country, where the number of reported abortions amounted to only 12 percent of the estimated need. By way of contrast, the number of abortions in metropolitan counties nationally equalled 84 percent of the estimated number of metropolitan women needing abortion services. Nationally there were an estimated 550,000 nonmetropolitan women who needed abortion services in 1978, whereas only 64,000 abortions took place in nonmetropolitan areas. Many of the nonmetropolitan women undoubtedly obtained abortions in metropolitan areas, with considerable difficulty for some, while others carried their unintended pregnancies to term.

An important measure of accessibility of abortion services is the presence of an abortion provider within a woman's county of residence. Even in rural areas, most women look to the population centers of their counties for health services. A provider serving a large number of abortion patients is likely to be a more accessible resource than a small provider, who may not be well known and may limit services to established patients.

As may be seen from Table V-4, 77 percent of U.S. counties had no identified abortion facility providing even one abortion during the year, and 84 percent had no facility reporting as many as 30 a year, or two a

month. An estimated 27 percent of women in need of abortion services lived in counties with no provider, and an additional five percent lived in counties where the largest provider reported fewer than 30 abortions during the year. The inadequacy of abortion services was especially evident in nonmetropolitan counties, 92 percent of which had no abortion provider serving even 30 women annually.

Most of the unserved nonmetropolitan counties have relatively small (under 400) numbers of women in need of abortion services. Services could be made available in such counties if a local physician chose to perform abortion procedures. In most cases the procedures would take place in a local hospital; most physicians with a small abortion caseload would not have the necessary equipment available in their offices. It is not clear to what extent the barrier to providing such services is the reluctance of physicians to perform abortions or restrictions imposed by hospitals on the use of their facilities for this purpose.

However, the many underserved counties where there is a potential demand for 400 or more abortion procedures could support small but adequately equipped abortion clinics. Such clinics serve a minimum of eight patients a week. The abortions are performed either by a local physician or one who comes from another area for the necessary number of hours a week.

As Table V-5 shows, there are 362 counties with no abortion provider reporting as many as 30 procedures a year and with an estimated 400 or more women in need of abortion services. There are 292,820 women in need of abortion services in these counties. Four states have more than 25 counties that singly or in groups could support an abortion clinic as described above: Louisiana, Ohio, South Carolina and Texas. Each of these states has more than 20,000 women in need of abortion services in these underserved counties. In South Carolina, 59 percent of women estimated to be in need of abortion services live in such counties; in Louisiana and Mississippi 40 percent of the women in need live in such counties. All but 10 states had at least one underserved county that could potentially support an abortion clinic.

The importance of accessible abortion services is illustrated in Table V-6, which compares the 10 states with the greatest availability of abortion services with the 10 states with least available services. (Service availability was measured by the proportion of women in need of abortion services who lived in counties with a facility providing at least 30 abortions during 1978.) In the states with the most available services, an average of 81 percent of the residents needing abortion services obtained them, either inside or outside the state, while in the 10 least well served states, only 34 percent of the need was met. Thus it is evident that if women are to receive the abortion services they want and need, it is important to have services available within their home counties or within a reasonable travel distance of their homes.

Trends in Availability

While abortion services increased rapidly in the first years after the Supreme Court decisions legalizing abortion in 1973, the rate of increase has been slow in recent years. As was explained earlier, the proportion of abortions occurring outside the woman's home state declined slightly, from 10 percent in 1976 to eight percent in 1978. Similarly, the abortion rates of the states whose rates are lowest are increasing somewhat more rapidly than those of the states with higher rates.

Two other measures of abortion service availability, the proportion of counties with services and the proportion of women living in counties with services, are shown in Table V-7. As may be seen from this table, there has been no change recently in the proportion of counties without a facility providing even one abortion per year or in the proportion of all women 15-44 living in such counties. In all three years, 1976, 1977 and 1978, 77 percent of counties had no abortion provider and 28 percent of women of reproductive age lived in counties with no abortion services. A slight improvement is evident, however, in the proportion of women living in counties with a large provider, that is, a provider serving 400 or more abortion patients during the year. This proportion rose from 51 percent in 1976 to 54 percent in 1977 and 55 percent in 1978. Compared to smaller providers, facilities performing 400 or more abortions usually represent more available services because larger providers are more visible and less likely to impose restrictions on services. Thus, there appears to be a continuing slight increase in the geographical availability of abortion services. This increase is probably due to growth in provider caseloads rather than relocation of providers in more populous counties.

Potential Hospital Providers

While there is enough potential demand for abortion services to support a free-standing abortion clinic in only 14 percent of the underserved counties,* many of these counties have hospitals in which outpatient abortion services could be established at reasonable cost. Both private (voluntary and proprietary) and public hospitals have enormous potential for improving the availability of services.

As may be seen in Table V-8, in 1978 abortions were provided in 29 percent of all short-term general non-Catholic hospitals. In only 20 percent of hospitals were as many as 30 abortions performed during the year (not shown). In the country as a whole there were 1,728 public and 2,185 private hospitals in which no abortion services at all were provided in 1978. Most of the public nonprovider hospitals and about half of the private ones were in nonmetropolitan areas, where abortion services are often unavailable from any other source. Two-thirds of the nonprovider hospitals were located in counties with no identified abortion facility.

---

* A caseload of 400 abortion patients a year is estimated to be the minimum size needed to support a free-standing clinic.

All of the 53 SMSAs with no abortion services (or with facilities meeting less than one percent of the need) had at least one hospital that could have provided such services; 29 had one or more public hospitals and 50 had one or more private hospitals. Of the other 78 SMSAs with less than 50 percent of need met, 42 had nonprovider public hospitals and 58 had nonprovider private hospitals that could have offered abortion services. Table 4 in the Detailed Tables section shows for each SMSA the number of public and private general short-term non-Catholic hospitals in which no abortions were performed.

Private hospitals are somewhat more likely than public hospitals to offer abortion services: 36 percent of the private, but only 18 percent of the public hospitals reported that at least one abortion was performed there in 1978. This pattern holds for both metropolitan and nonmetropolitan areas.

Document #7

Abortion Services in the United States, 1979 and 1980

By Stanley K. Henshaw, Jacqueline Darroch Forrest, Ellen Sullivan and Christopher Tietze

Summary

• There were 1.55 million legal abortions in the United States in 1980. About three percent of the 53 million women of reproductive age obtained an abortion, and one-fourth of pregnancies—a little less than half of all that were unintended—were terminated by abortion.

• While the abortion rate is increasing somewhat, the increases have become progressively smaller over the years. The rate increased by two percent between 1979 and 1980, compared with an increase of four percent between 1978 and 1979, and with larger increases in previous years. If these trends continue, the abortion rate may be expected to stabilize at 1980 levels or to rise only slightly. Several factors help account for the continuing increase in the abortion rate.

• The most important factor influencing the increase since 1975 appears to be a rise in the rate of unintended conceptions. This increase is attributable mainly to a sizable shift from use of the most effective reversible methods of contraception, the pill and the IUD, largely as a result of reports of serious although rare health consequences associated with their use.

• Geographic availability of abortion services increased slightly between 1978 and 1980, despite the heightened public controversy over abortion (which might have been expected to have a chilling effect upon potential providers). Nonetheless, abortion services are still not readily available to all women. Seventy-eight percent of all U.S. counties had no identified abortion service provider in 1980, and 28 percent of women of reproductive age lived in these counties.

• Fifty-nine of the nation's 305 standard metropolitan statistical areas (SMSAs), which contain cities of substantial size, had no facility providing abortions, and an additional 25 SMSAs reported fewer than 50 abortions in 1980.

• Three-fourths of all abortions in 1980 took place in the 459 clinics and hospitals that provided 1,000 or more abortions each, although abortions were reported in 2,758 different facilities.

• Almost 80 percent of all abortions were performed in nonhospital facilities in 1980, compared with fewer than 30 percent in 1973. The proportion performed in hospitals dropped from a high of 52 percent in 1973 to just 22 percent in 1980. Among the reasons for this change in type of provider is that improvements in and simplifications of the technology by means of which abortions can be performed safely have made services in freestanding facilities an increasingly practical and suitable option, far less costly than hospital-based services.

• About one in 10 obstetrician-gynecologists in private practice performed abortions in their offices 1980.

Factors in addition to limitations on geographic availability that restrict women's access to abortion services are

• the lack of Medicaid funding for most abortions in all but 14 states and the District of Columbia, affecting the poorest women;

• parental notification and consent requirements imposed by 19 percent of abortion clinics and by law in seven states (although the constitutionality of such legislative requirements is being challenged in the courts);

• the fact that 30 percent of abortion providers perform abortions only at 10 or fewer weeks' gestation and that only 21 percent perform abortions after 14 weeks, as measured from the last menstrual period;

• the absence of outpatient abortion services

About one-fourth of all pregnancies, just under one-half of all that were unintended, were terminated by abortion in 1980. Increases in the abortion rate, which was 30.0 per 1,000 live births in 1980, are slowing; if the trend continues, the abortion rate should stabilize this year.

Abortion in a freestanding clinic. About 8 in 10 terminations occurred in such facilities in 1980.

Stanley K. Henshaw is Senior Research Associate, Jacqueline Darroch Forrest is Director of Research and Ellen Sullivan is Research Associate with The Alan Guttmacher Institute. Christopher Tietze, a member of the Institute's Science Advisory Panel, is Senior Consultant with The Population Council and directs its abortion research activities. The survey on which this article is based was supported in part by grants from The George Gund Foundation, The Huber Foundation and The David and Lucile Packard Foundation. Details of the methodology and detailed tables may be found in S. Henshaw, J. D. Forrest, E. Sullivan and C. Tietze, *Abortion 1979–1980: Need & Services in the United States, Each State & Metropolitan Area*, The Alan Guttmacher Institute, New York, 1982 (forthcoming).

Table 1. Number of reported abortions and number of facilities, by metropolitan status; rate of abortions per 1,000 women aged 15–44; and ratio of abortions per 1,000 abortions plus live births; United States, 1973–1980

Measure and metropolitan status	1973	1974	1975	1976	1977	1978	1979	1980* (Proj. pop.)	1980† (Census)
(1) No. of abortions (000s)									
Total	744.6	898.6	1,034.2	1,179.3	1,316.7	1,409.6	1,497.7	1,553.9	1,553.9
Metro	720.2	860.7	985.7	1,123.3	1,258.0	1,345.2	1,430.9	1,483.9	1,507.7
Nonmetro	24.4	37.9	48.5	56.0	58.7	64.4	66.8	70.0	46.2
(2) No. of facilities									
Total	1,627	2,028	2,398	2,567	2,688	2,753	2,734	2,758	2,758
Metro	1,302	1,615	1,903	2,036	2,139	2,198	2,213	2,244	2,318
Nonmetro	325	413	495	531	549	555	521	514	440
(3) Abortion rate	16.6	19.6	22.1	24.5	26.9	28.2	29.3	30.0	29.4
(4) Abortions per 1,000 abortions plus live births‡	193	220	249	265	286	294	297	300	300

*Metropolitan status and population estimates comparable to those used for 1979 calculations. See † on page 7.

†Metropolitan status and population estimates based on 1980 census. The April 1, 1980, census count was used since projections were not available for July 1, 1980, national and state populations by sex and age. It is estimated that the abortion rate based on the July 1 population would be 29.3.

‡For each year, births occurring during the 12-month period starting in July of that year (to match time of conception of pregnancies ending in births with that of pregnancies ending in abortions).

Sources: 1973–1978—see reference 2; 1979–1980 abortion and provider data—AGI abortion survey; population data—U.S. Bureau of the Census, "Estimates of the Population of the United States, by Age, Race, and Sex: 1976–1979," *Current Population Reports*, Series P–25, No. 870, 1980, Table 2; ——, "Projections of the Population of the United States: 1977 to 2050," *Current Population Reports*, Series P–25, No. 704, 1977, Table 8; and ——, "Age; Sex, Race, and Spanish Origin of the Population by Regions, Divisions, and States: 1980," *Supplementary Reports*, PC80–S1–1, 1981; birth data—National Center for Health Statistics, DHHS, "Births, Marriages, Divorces, and Deaths for June 1981," *Monthly Vital Statistics Report*, Vol. 30, No. 6, 1981.

in 45 percent of the hospitals that provide abortions; and

- the practice of 74 percent of hospitals reporting abortions not to accept abortion patients directly but to require that they be referred by an attending physician.

Introduction and Methodology

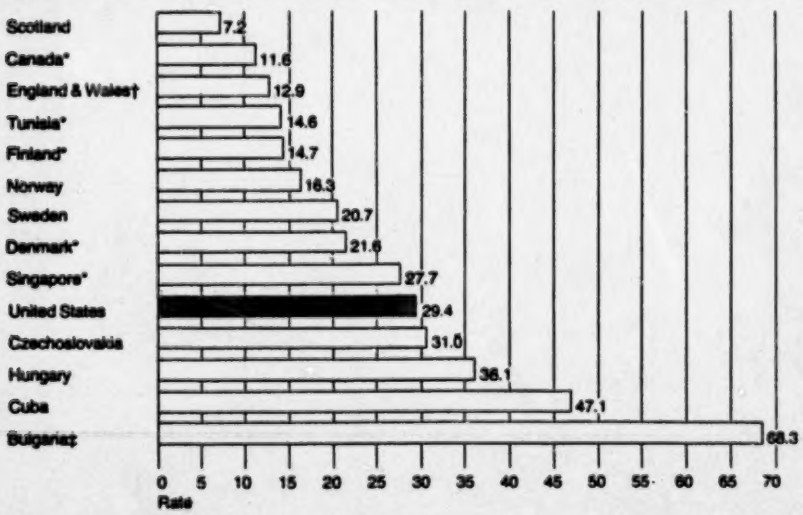
Since the 1973 Supreme Court rulings legalizing abortion in the United States, The Alan Guttmacher Institute (AGI) has monitored the availability and accessibility of abortion services throughout the country through national surveys of all known providers of abortion services—public and private hospitals, freestanding clinics and private physicians. The data thus obtained provide the only national information on the number of abortion service providers and the numbers of abortions by geographic area and by type of facility. This article describes some of the results of the AGI's seventh abortion survey, fielded in the spring and summer of 1981 and covering two years, 1979 and 1980. In this article, we will concentrate on the availability and accessibility of abortion services according to such factors as geographic concentration of services, types of facilities, Medicaid funding, parental notification and consent restrictions, acceptance of self-referred patients and limits on the gestational age at which abortions are performed.

In the 1981 survey, providers were asked to report the number of abortions performed in 1979 and 1980, and to provide gestational data and information about the delivery of services. Questionnaires were sent to facilities that had reported abortions in either 1977 or 1978 as well as to other facilities thought to have provided abortions in 1979 or 1980. New providers were identified through newspaper articles from a national clipping service and through queries to persons knowledgeable about local abortion services, such as state coordinators of the National Abortion Rights Action League and Planned Parenthood affiliates.

Two follow-up mailings were sent to facilities that did not respond to the original one. If no response was received, state health department data were used where available; if they were not available, attempts were made to elicit the information through telephone calls. In a few instances, when these efforts were unsuccessful, estimates were obtained from knowledgeable persons in the community. By means of these procedures, information was obtained for 94 percent of the potential respondents. The most extensive follow-up efforts were concentrated on the larger providers; nonrespondents are believed to have provided few abortions in the study years.*

The number of abortions reported to the AGI is typically higher than the number reported to the Centers for Disease Control (CDC),[1] the other source of national data on abortion. The reason is that the AGI surveys providers directly, while the CDC data for most states are based on summary information reported by state health departments, which may not receive information from all

Figure 1. Rates of legal abortion per 1,000 women aged 15–44, various countries, 1980



*1979. †Residents only. ‡1978.

Sources: C. Tietze, *Induced Abortion: A World Review*, The Population Council, New York, 1981; and data collected by C. Tietze from various sources.

*For a more detailed explanation of the survey methodology, see reference 2 and citation in biographical footnote on page 3.

providers. Discrepancies between the resulting national estimates are due to differences in the methods of data collection.*

Although the AGI surveys undoubtedly include almost all sizable abortion providers, there are probably some smaller providers that have not been identified. Supplementary sample surveys of obstetrician-gynecologists and of hospitals have been conducted to estimate the degree of error.[2] Data from both these surveys suggest that the actual number of abortions performed may in fact be three to six percent higher than the number reported to the AGI. The numbers and analyses presented here are based on the reported number of abortions; data are not adjusted for the possible undercount.

Findings

As panel 1 of Table 1 shows, there were 1,497,700 legal abortions in 1979 and 1,553,900 in 1980. About three percent of the 53 million women aged 15–44 (29.4 per 1,000, as seen in panel 3†) obtained legal abortions in 1980. As in previous years, the vast majority of abortions (96 percent) were concentrated in metropolitan areas. The overall number of providers (panel 2) and the number in metropolitan areas rose slightly in 1980, but the number in nonmetropolitan areas declined somewhat. The ratio was 300 abortions per 1,000 pregnancies ending in live births or abortions (panel 4). When miscarriages and stillbirths are taken into account, the proportion of pregnancies ending in abortion is about one-fourth.

The number of legal abortions reflects the number of unintended pregnancies experienced by American women. In 1978 (the latest year for which estimates have been made), there were more than three million unintended pregnancies; this figure represents 55 percent of the 5.6 million pregnancies that occurred that year. Just under half of these unintended pregnancies were terminated by abortion; the remainder resulted in births or miscarriages.[3] Thus, the abortion rate is much lower than it would be if many women did not carry unintended pregnancies to term, either by choice or because they were unable to obtain abortion services.

As Figure 1 shows, the abortion rate is higher in the United States than in the Western European countries for which accurate data are available and is lower in the United States than in Eastern European countries and Cuba. Rates are estimated to be even higher in Japan and the Soviet Union (not shown).

As shown below, the rate of increase in abortions has been declining steadily and appears to be leveling off. There was a four percent increase between 1978 and 1979, and a two percent increase between 1979 and 1980. If this trend continues, figures for 1981 or 1982 should show that the rate has stabilized.

Year	Abortion rate	% increase over previous year
1973	16.6	u
1974	19.6	18
1975	22.1	13
1976	24.5	11
1977	26.9	10
1978	28.2	5
1979	29.3	4
1980	30.0	2

Note: u = unavailable.

Much of the rise in the abortion rate and ratio in the first years after legalization, between 1973 and 1975, may be attributed to the rapid diffusion of abortion services (and of information regarding availability) to most large metropolitan areas during that period.

Since 1975, the most important factor in the abortion rate rise has probably been the increased rate of unintended pregnancy due to a widespread shift away from the use of the most effective methods of contraception. The proportion of all American women aged 15–44 using the pill is estimated to have fallen by as much as one-fourth between 1975 and 1978, and has probably declined further since.‡ Because most of the women who would previously have used oral contraceptives are undoubtedly using methods with higher use-failure rates or are using no method at all, the shift away from the pill could account for much of the increase in the national abortion rate. Other factors that may be contributing to the rising rate of unintended pregnancy—and, therefore, to the rising abortion rate—are a decrease in the use of the IUD[4] and an increase in the proportion of unmarried women who are sexually active.[5] Increased use of contraceptive sterilization,[6] on the other hand, is working to reduce the rate of unintended pregnancy. In addition, the abortion rate may be affected by changes in the proportion of women who choose to terminate unintended pregnancies by abortion, although there will be no measure of this until data from Cycle III of the National Survey of Family Growth become available.

If the U.S. abortion rate stabilizes at or near its present level, the implication is not necessarily that all women needing abortion services are able to obtain them, or that women who can obtain them are able to do so readily. There is abundant evidence that many women still find abortion services difficult or impossible to get because of the distance they live from the nearest provider, the cost, a lack of information on where and how to get an abortion and other restrictions. Plateauing of the abortion rate may, in fact, reflect a freezing of the abortion delivery system or an increase of restrictions on the provision of abortion. The data below describe the variations in abortion service availability across the United States, the diverse types of providers that represent a small subset of the medical system women generally use and the restrictions some women must contend with once they locate a provider.

Geographic Availability

Even after eight years of slow diffusion, abortion services are not uniformly available in all areas of the country. An indication of maldistribution of abortion services is the wide variation among states in the abortion occurrence rate (i.e., the number of abortions obtained in the state per 1,000 women aged 15–44 who live in the state). Although one would expect a degree of variation in abortion rates, as in birthrates, the observed range—from seven in West Virginia to 47 in Nevada—is very large, as Table 2 (page 8) shows.§ In some cases, neighboring states—Kansas and Nebraska, North Dakota and South Dakota, and New Hampshire and Vermont, for example—that are generally similar in other respects have markedly different abortion rates, apparently because of differing abortion service availability.

Past inadequacy of abortion services is reflected in the fact that states with the largest percentage increases in abortions between

*Not all states require reporting of abortions. In addition, in states that do have reporting systems, there are variations in the types of providers that must report, in the completeness of reporting by providers and in the follow-up by the health department.

†The 1980 census found about two percent more women of reproductive age than had been projected from earlier data. Therefore, the abortion rate based on the actual 1980 census count (29.4) is about two percent lower than that calculated using the number of women that had been projected (30.0). Since the rates for 1979 and earlier years were calculated using projected population estimates, the 1980 rate based on the projected population will be used for all comparisons with earlier years, although the rate based on the new census data is more accurate.

‡Pill use calculated from "OCs—Update on Usage, Safety, and Side Effects," *Population Reports*, Series A, No. 5, Jan. 1979, and AGI, *Data and Analyses for 1980 Revision of DHHS Five-Year Plan for Family Planning Services*, New York, 1981.

§Birthrates per 1,000 population in 1978 ranged from 11.9 in Massachusetts to 29.5 in Utah, a difference of a factor of 2.5, compared to a difference of a factor of 6.7 between the highest and lowest state abortion rates. (For birthrates, see: U.S. Bureau of the Census, *Statistical Abstract of the United States, 1980*, U.S. Government Printing Office, Washington, D.C., 1980.)

Table 2. Number of reported abortions by state of occurrence, 1978, 1979 and 1980; change 1978–1980; percentage change 1978–1980; and rate per 1,000 women aged 15–44, 1980

State	No. of abortions			Change 1978–1980	% change 1978–1980	Abortion occurrence rate, 1980*
	1978	1979	1980			
U.S. total	1,409,600	1,497,670	1,553,890	144,290	10	29.4
Ala.	15,120	17,590	20,780	5,660	37	23.2
Alaska	2,600	1,890	1,890	−710	−27	18.0
Ariz.	13,370	14,500	15,790	2,420	18	25.3
Ark.	5,150	6,110	6,190	1,040	20	12.3
Calif.	234,520	248,080	250,380	15,860	7	44.0
Colo.	19,800	22,420	23,140	3,340	17	31.6
Conn.	17,800	18,390	18,450	650	4	25.6
Del.	3,470	3,650	3,740	270	8	26.0
D.C.	30,850	28,670	28,520	−2,330	−8	167.8
Fla.	63,470	70,190	73,580	10,110	16	35.8
Ga.	36,080	38,760	37,890	1,810	5	28.6
Hawaii	7,090	7,600	7,960	870	12	34.5
Idaho	1,800	2,050	2,740	940	52	12.8
Ill.	70,280	70,920	69,110	−1,170	−2	26.0
Ind.	15,340	18,910	19,630	4,290	28	15.4
Iowa	7,530	9,280	9,280	1,750	23	14.3
Kans.	12,870	13,720	13,570	700	5	25.6
Ky.	12,470	12,860	12,820	350	3	15.2
La.	13,290	16,040	17,680	4,390	33	17.7
Maine	5,150	4,680	4,750	−400	−8	18.7
Md.	25,780	28,020	30,490	4,710	18	29.3
Mass.	42,610	45,110	45,590	2,980	7	33.6
Mich.	58,550	63,020	65,230	8,680	15	29.8
Minn.	17,580	19,080	19,920	2,340	13	20.8
Miss.	4,010	5,060	6,080	2,070	52	10.7
Mo.	15,570	17,740	21,620	6,050	39	19.4
Mont.	3,100	3,550	3,670	570	18	20.2
Nebr.	6,630	5,660	6,350	−280	−4	18.0
Nev.	6,060	8,200	9,170	3,110	51	47.2
N.H.	3,960	4,210	4,660	680	17	21.3
N.J.	48,040	51,230	55,460	7,420	15	32.9
N. Mex.	6,250	8,020	8,410	2,160	35	27.2
N.Y.	187,050	183,190	187,460	410	†	45.9
N.C.	30,120	30,370	31,890	1,770	6	22.9
N. Dak.	2,240	2,810	3,140	900	40	21.6
Ohio	57,140	64,380	67,140	10,000	18	26.8
Okla.	11,180	10,820	11,280	100	1	16.5
Oreg.	14,450	17,690	17,670	3,220	22	26.5
Pa.	65,150	64,920	68,910	3,760	6	26.1
R.I.	4,570	5,650	6,640	2,070	45	30.8
S.C.	13,050	13,170	13,660	610	5	18.3
S. Dak.	1,400	1,440	1,360	−40	−3	9.1
Tenn.	23,040	25,430	25,590	2,550	11	23.7
Tex.	83,280	94,080	102,000	18,720	22	30.2
Utah	3,150	3,810	4,200	1,050	33	12.4
Vt.	3,290	3,380	3,760	470	14	30.6
Va.	30,370	31,380	31,760	1,390	5	24.3
Wash.	34,490	35,580	37,030	2,540	7	37.7
W. Va.	2,840	3,100	3,000	160	6	7.0
Wis.	17,510	20,240	21,790	4,280	24	20.1
Wyo.	1,070	1,020	1,070	0	0	9.6

*Rate based on April 1, 1980, populations from U.S. Bureau of the Census, unpublished data from the 1980 census.
†Less than 0.5 percent.

1978 and 1980 tended to have low abortion rates in 1978. The number of abortions increased by at least one-third in 10 states—Alabama, Idaho, Louisiana, Mississippi, Missouri, Nevada, New Mexico, North Dakota, Rhode Island and Utah. The average abortion occurrence rate in 1978 in these states was 17.0, much lower than the average of 23.7 in all other states (not shown). In these 10 states, an average of 25 percent of women obtaining abortions traveled out of state for their procedures in 1978, compared to 15 percent of those who lived in the other 40 states.* In four of the 10 states (Alabama, Louisiana, Mississippi and Missouri), abortions occurring in clinics established since 1978 amounted to between 21 and 30 percent of the number that were performed in 1978, suggesting that the addition of new providers in these states enabled more women to terminate unintended pregnancies by abortion or to do so without traveling to other states. That the opening of a single abortion facility can influence a state's abortion occurrence rate, as happened in Mississippi, suggests that many women are unable to obtain the abortion services they want and need when these services are unavailable locally.*

The AGI has attempted to measure the availability of abortion services more directly by calculating the proportion of women of reproductive age living in counties without any abortion services. This measure is imperfect, since the existence of a single abortion facility in a woman's county of residence may not mean that the specific services she needs are available and accessible to her; conversely, many women in counties without a provider may have access to a facility in a neighboring county. Nevertheless, the absence of an abortion provider in a woman's home county suggests that abortion services are not readily available to her.

Evidence of the importance of having abortion services available locally may be found by relating the availability of abortion services in a state to the resident abortion rate (i.e., the number of abortions obtained in the state or elsewhere by state residents per 1,000 state residents).† In 1978, among the 50 states there was an extremely high correlation (0.81) between the proportion of women living in counties with any abortion services and the proportion of residents of

(Continued on page 10)

*For another study showing that abortion rates tend to rise when abortion services become available locally, see: J. D. Shelton, E. A. Brann and K. F. Schulz, "Abortion Utilization: Does Travel Distance Matter?" *Family Planning Perspectives*, 8:260, 1976.

†A later article will present resident abortion rates for each state.

(Continued from page 8)

the state who obtained an abortion.* That is, abortions were much more likely to be obtained by residents of states where most women live in counties with abortion services than by residents of states where few women live in counties with services.

Although many of the women living in unserved areas apparently are unable to obtain abortions, some are able to travel to other cities, even great distances, for abortion services. However, the need to travel, especially when long distances are involved, presents substantial disadvantages for many women: Costs are increased because of travel expenses and the possible need for overnight lodging, rapid diagnosis and treatment of postabortion complications are more difficult, and privacy is jeopardized by the need to be away from home and work for a longer period of time. If, because of distance or any other factor, the abortion is delayed until a later point in gestation, the risk of morbidity and mortality increases, [8] and the cost of the procedure may increase as well. The problems caused by distance are particularly severe for low-income women and teenagers.

Results of the 1980 survey make clear that many women live in areas that still have no abortion services available. As Table 3 shows, 78 percent of all U.S. counties have no identified abortion service provider, and about 28 percent of all women of reproductive age live in these counties.

Calculations were also made of the proportion of women living in counties without at least one facility providing 400 or more abortions during 1980, since a provider of this size is more likely to be known and accessible to the average women than is a smaller facility. In 92 percent of counties, no facility reported 400 or more abortions; 44 percent of women live in these counties.

Furthermore, since 1976 the extension of abortion services to previously unserved areas has proceeded at a slow pace, after the substantial gains that were registered between 1973 and 1976, as the table shows. The proportion of women living in unserved counties has remained virtually unchanged since 1976; the proportion living in counties without a provider of 400 or more abortions has declined slightly. (As was shown in Table 1, a similar pattern is evident in the total number of identified abortion service providers, which increased by 58 percent from 1973 to 1976, but has increased by only seven percent since 1976.)

The problem of access to abortion services is particularly severe for nonmetropolitan women, since abortion facilities are concentrated in urban areas. Almost 70 percent of nonmetropolitan women live in counties with no facility reporting even one abortion, as Table 3 shows, and 95 percent live in counties without a provider reporting 400 or more abortions. Put another way, only 4.5 percent of abortions take place in nonmetropolitan areas, although about 26 percent of women of reproductive age live in these areas (not shown). The situation has changed little since 1974, when 4.2 percent of abortions were reported in nonmetropolitan areas. Since 1978, the number of nonmetropolitan abortion providers has declined slightly, while the number of providers in metropolitan areas has continued to increase slowly.

Even in metropolitan areas, however, 13 percent of women live in counties without an abortion facility, and 26 percent live in counties without any facility reporting 400 or more abortions. Fifty-nine of the 305 SMSAs have no identified abortion provider and an additional 25 SMSAs report fewer than 50 abortions. Table 4 lists these areas. Each SMSA would have more than 400 abortions if their abortion rates approached the national average.

Map 1 (page 13) shows the availability of abortion services in each state. In 15 states, fewer than half of all women of reproductive age live in counties with an identified abortion service provider. In four states—Mississippi, North Dakota, South Dakota and West Virginia—fewer than one-quarter of such women live in counties with any provider (not shown).

Table 3. Percentage of counties with no abortion facilities and percentage of women aged 15–44 living in counties with no abortion facilities, by metropolitan status,* 1973–1980

Measure	1973	1974	1975	1976	1977	1978	1979	1980
Counties (N=3,105)								
% with no facility	83.3	80.5	78.6	77.3	76.9	77.0	77.9	77.7
Metro	56.6	51.6	49.1	47.5	46.6	46.6	46.7	46.9
Nonmetro	90.3	88.1	86.3	85.0	84.8	84.9	86.0	85.8
% without at least one facility reporting ≥400 abortions during the year	96.2	94.8	94.0	93.5	92.7	92.7	92.4	92.2
Metro	82.7	77.0	74.7	72.2	68.9	68.9	67.7	67.2
Nonmetro	99.8	99.4	99.1	99.0	98.9	98.8	98.8	98.7
Women aged 15–44† (N=50,029,000)								
% living in a county with no facility	35.0	31.3	29.2	28.0	27.6	27.7	27.9	27.9
Metro	20.0	18.2	14.8	13.9	13.3	13.4	13.1	13.3
Nonmetro	77.5	74.2	70.1	67.9	68.3	68.3	69.6	69.4
% living in a county without at least one facility reporting ≥400 abortions during the year	59.4	53.6	51.1	48.5	45.7	45.4	44.1	43.8
Metro	45.4	37.9	35.0	31.5	28.0	27.6	26.0	25.8
Nonmetro	99.0	98.0	96.6	96.5	96.0	95.9	95.5	95.0

*Data for metropolitan areas are presented for SMSAs and New England County Metropolitan Areas as defined by criteria published by the Office of Management and Budget, Oct. 1975.

†Based on 1978 population estimates.

Where Women Go for Abortion Services

While a large number of facilities—2,758—report providing abortion services, only a small fraction of these represent meaningful access to abortion services for more than a few women. The majority of abortions occur in a relatively small number of large facilities, as Table 5 (page 12) makes clear. Seventy-six percent of abortions are performed in the 459 nonhospital clinics and hospitals that serve 1,000 or more abortion patients during the year; 18 percent occur in the 38 facilities that perform 5,000 or more abortions. In many instances, the large facilities are especially effective in providing access because of their relatively low fees[9] and their visibility, due both to their size and to the fact that many of them advertise their existence and the services they offer. On the other hand, small providers also may play an important role in providing access to services in areas without other abortion facilities.

• *Hospitals.* The AGI survey identified 1,304 hospitals reporting abortions in 1980, which constitute 35 percent of all abortion providers. The average caseload of the hospitals is small, however, and only 22 percent of all abortions take place in hospitals. About one-third of the hospitals report fewer than

*Adjusted for state differences in the age and race distributions of women aged 15–44, since these factors are highly related to abortion utilization.

30 abortions each. Some report only one or two abortions, indicating that abortions are performed only in special situations and are not generally available.

Although many poor women rely on public hospitals as their primary source of health care, public hospitals are less likely than private hospitals to provide abortions, as Table 6 (page 12) shows. Only 17 percent of public hospitals, compared with 34 percent of private general hospitals, report any abortions. These differentials are evident in metropolitan and nonmetropolitan areas.

Table 7 (page 12) provides a more detailed breakdown of the types of public and private hospitals and nonhospital facilities providing abortion services.

Over time, abortion services have become slightly less available in hospitals. The proportion of short-term general non-Catholic hospitals reporting abortion services has fallen by four percentage points since 1976 (not shown). Between 1978 and 1980, while the number of nonhospital facilities has increased, the number of hospitals reporting abortions has fallen by 122, or eight percent. Among public hospitals, there has been a sharp drop in the number of military facilities reporting abortions because of restrictions imposed by federal legislation,*[10] but among other types of public hospitals the drop was only two percent (not shown). Among the private hospitals, the drop was eight percent for the voluntary (nonprofit) non-church-affiliated hospitals and six percent among the proprietary (for profit) hospitals. Abortion services declined among both proprietary and nonmilitary public hospitals. Since proprietary hospitals are believed to be less affected by public opinion than public facilities, it may be inferred that the decline in services among nonmilitary public hospitals resulted from factors affecting all types of hospitals rather than simply pressure exerted by antiabortion groups.

In fact, each year since abortion was legalized, a decreasing proportion of abortions have taken place in hospitals. As Table 8 (page 13) shows, in 1973, 52 percent of all abortions were performed in hospitals, but by 1980 the proportion had fallen to 22 percent. The actual number of abortions occurring in hospitals also dropped between 1973 and 1980, by 17 percent in public hospitals and by 10 percent in private hospitals. The table also shows the striking concomitant increase in the number of abortions performed in nonhospital facilities.

*The annual appropriations bill for the Department of Defense for FY 1979 contained a rider severely restricting the abortion coverage of CHAMPUS, the health insurance plan for military dependents and retirees.

A number of factors have encouraged the shift from hospitals to nonhospital facilities. By 1973, there had been relatively little experience with abortion, and much of the medical profession assumed that the procedure would be safest if performed in a hospital setting. As experience increased, and as vacuum aspiration replaced sharp curettage as the predominant procedure, it became evident that first-trimester abortion, when performed as an ambulatory procedure in a properly equipped nonhospital clinic or doctor's office, is at least as safe as when performed in a hospital.[11] (Other types of minor surgery are also being performed increasingly in doctors' offices and nonhospital surgicenters.) The development of the dilatation and evacuation procedure has extended to at least 16 weeks the gestation at which abortions can be performed safely in clinics.[12] Given the safety of outpatient abortions, the cost advantage of clinics became an important factor encouraging women to turn to clinics for abortion services.[13] Hospital abortions usually involve both physician fees and charges for use of the hospital facilities, and in many cases patients must pay for one or two days of hospitalization. Additional advantages of specialized high-volume abortion facilities are the expertise that results from the staff's performing a procedure many times; the attitudes and skills of the personnel, who, unlike the usual hospital staff, are selected and trained to serve abortion patients; and the availability of trained abortion counselors. While some hospitals have developed outpatient abortion clinics that have the advantages of freestanding clinics, most do not appear to be interested in developing such a facility, in part because of the public relations problems that might result.

• *Nonhospital facilities.* Most of the large abortion providers are nonhospital clinics. As noted above, 38 facilities perform 5,000 or more abortions; 34 are nonhospital clinics and four are hospitals. Similarly, 345 of the 421 facilities that report 1,000 to 4,999 abortions are nonhospital facilities.

The availability of nonhospital abortion services has increased somewhat since 1978. As was shown in Table 7, the total number of nonhospital facilities providing abortions has grown by 11 percent since 1978. Perhaps more important to women seeking abortions, the number of clinics serving 400 or more abortion patients has grown by 18 percent, and the number of physicians' offices reporting this many abortions has risen by 22 percent. Although many new large facilities are located in areas with existing providers, or were small facilities whose caseloads have increased, others have opened in previously unserved areas and represent a continuing

Table 4. SMSAs reporting fewer than 50 abortions, by state, 1980

State and SMSA	State and SMSA
Alabama	**North Dakota**
Anniston*	Bismarck
Florence*	Fargo
Gadsden	
	Ohio
Arkansas	Canton*
Fayetteville*	Hamilton*
Ft. Smith*	Lima
Texarkana*	Lorain
	Mansfield
California	Newark
Visalia*	Springfield
	Steubenville
Colorado	
Pueblo*	**Oklahoma**
	Enid
Florida	Lawton
Bradenton*	
Ft. Walton Beach*	**Pennsylvania**
Panama City*	Altoona*
	Erie
Georgia	Johnstown*
Athens*	Lancaster
	Sharon*
Illinois	State College
Bloomington	
Decatur	**South Carolina**
Kankakee	Anderson
Springfield	Florence
	Rock Hill
Indiana	
Anderson	**South Dakota**
Elkhart	Sioux Falls
Kokomo	
Lafayette	**Tennessee**
Muncie	Clarksville
Terre Haute	
	Texas
Iowa	Abilene*
Dubuque	Amarillo*
	Bryan
Kentucky	Galveston*
Owensboro	Laredo
	Longview
Louisiana	Midland
Alexandria	San Angelo
Lafayette	Sherman
Lake Charles	Tyler
Monroe	Victoria
	Waco
Maine	
Lawiston*	**Utah**
	Provo
Michigan	
Battle Creek*	**Virginia**
Bay City*	Danville
	Washington
Minnesota	Bremerton
St. Cloud	Richland
Mississippi	**West Virginia**
Pascagoula	Huntington
	Parkersburg
Missouri	
Joplin	**Wisconsin**
St. Joseph	Appleton*
	Janesville
New Jersey	Kenosha
Vineland	LaCrosse*
	Sheboygan
New Mexico	Wausau
Las Cruces*	

*Reported between one and 50 abortions in 1980. SMSAs without an asterisk did not report any abortions in 1980.

Table 5. Number and percentage distribution of abortion service facilities and abortions, by type of facility, according to caseload, 1980

Caseload*	Facilities						Abortions					
	Total		Hospital		Nonhospital		Total		Hospital		Nonhospital	
	N	%	N	% of total	N	% of total	N	%	N	% of total	N	% of total
Total	2,758	100	1,504	55	1,254	45	1,553,890	100	341,030	22	1,212,860	78
<30	650	24	520	19	130	5	6,880	†	5,210	†	1,670	†
30-390	1,352	49	788	29	564	20	179,280	12	95,540	6	83,740	5
400-990	297	11	116	4	181	7	189,090	12	68,440	5	120,650	8
1,000-4,990	421	15	78	3	345	12	905,910	58	142,240	9	763,670	49
≥5,000	38	1	4	†	34	1	272,730	18	29,600	2	243,130	16

*In this and subsequent tables, caseloads are rounded to nearest 10. †Less than one percent.

Table 6. Percentage of short-term general non-Catholic hospitals providing abortions, by metropolitan status, according to hospital type, 1980 (number of hospitals in each cell shown in parentheses*)

Metropolitan status	Hospital type					
	Total		Public		Private	
U.S. total	27	(5,538)	17	(2,118)	34	(3,420)
Metro	42	(2,700)	32	(680)	45	(2,020)
Nonmetro	13	(2,838)	10	(1,438)	16	(1,400)

*Numbers of hospitals are based on a special tabulation of the 1978 American Hospital Association (AHA) hospital survey. From 1978 to 1980, the number of public hospitals declined by 0.1 percent and the number of private hospitals declined by 0.5 percent. (See: AHA, *American Hospital Association Guide to the Health Care Field, 1981 Edition*, Chicago, 1981, Table 1.)

slow diffusion of abortion services to an ever larger proportion of the population.

Many of the clinics offering abortion services cannot be characterized accurately as abortion clinics. Twenty percent of those responding to the AGI survey describe their facilities as general ob-gyn practices that include abortion among other services provided, four percent offer general fertility-related services and six percent say they provide general medical care (see Table 9, page 14). Another four percent, classified as "other," are mainly surgical practices or multispecialty groups. While nonabortion services are more commonly offered by the clinics providing smaller numbers of abortions, 18 percent of even the largest abortion providers, those reporting 1,000 or more abortions, describe their primary services as other than abortion. Although it may be easier for women seeking abortions to find out about specialized abortion clinics, the existence of abortion services in a variety of types of clinics in a single metropolitan area undoubtedly facilitates their access to abortion services.

Among the physicians providing fewer than 400 abortions in their offices, almost all—87 percent—are described as having ob-gyn practices (not shown). Only six percent have general medical practices. However, general practitioners performing abortions may be less well covered by the AGI survey than are obstetrician-gynecologists.

The AGI survey identified 723 physicians' practices where office abortions are performed; this number represents only a small proportion of the 18,000 obstetrician-gynecologists in private practice in the United States.[14] The questionnaire that went to private medical practices asked how many physicians in the practice provide abortions. Most practices (63 percent) report that only one physician performs abortions, although the numbers range as high as eight or more. Thus, assuming that the numbers of physicians per practice are similar among respondents and nonrespondents, it can be estimated that the number of physicians reporting abortions in their offices is 1,200. This estimate is a minimum figure, since it is known that the survey misses some physicians who perform small numbers of abortions in their offices. Allowing for a possible undercount, about one in 10 obstetrician-gynecologists in private practice perform abortions in their offices. Thus, relatively few women are able to obtain abortion services in the offices of their private gynecologists or obstetricians.

Restrictions on Services

Even a woman who lives in an area with an abortion provider may not be able to obtain the abortion services she needs locally. There are a number of restrictions on services that preclude many women from utilizing a particular facility or even any facility in an area or state. Some of these restrictions result from legislation or from provider policies intended to limit the number of abortions; others represent limitations of the resources and capabilities of providers. Among the restrictions are parental notification and consent requirements for minors, Medicaid funding limitations, lack of outpatient abortion services in many hospitals where abortions are performed, the policy of some providers not to accept new patients seeking abortions and limitation of abortion to early gestational ages.

• ***Parental notification and consent.*** Parental notification and parental consent requirements can pose a significant obstacle for minors seeking abortion services. These requirements have been imposed both by individual abortion providers and by state and local legislation, although the constitutionality of such legislation is being challenged. According to a survey of abortion providers conducted by the AGI,[15] 38 percent of hospitals and 19 percent of clinics have parental consent or notification requirements for minors under age 18; and 48 and 38 percent of hospitals and clinics, respectively, have such requirements for those under 15. It is estimated that 37 percent of teenagers under 18 who obtained legal abortions in 1978 did so in hospitals and clinics with parental consent or notification requirements.

In Maryland, Montana and Utah, laws are in effect that require parental notification;

Table 7. Number of facilities providing abortion services, by type of facility, 1978, 1979 and 1980, and change 1978–1980

Facility	1978	1979	1980	Change 1978–1980	
				N	%
All facilities	2,753	2,734	2,758	5	*
HOSPITALS					
Total	1,626	1,526	1,504	−122	−8
Public	390	363	357	−33	−8
Military	35	9	8	−27	−77
Other federal	3	3	3	0	0
State	43	41	41	−2	−5
Hospital district	126	136	136	10	8
County	113	105	102	−11	−10
City; city/county	70	69	67	−3	−4
Private	1,236	1,163	1,147	−89	−7
Voluntary, church	72	75	70	−2	−3
Voluntary, other	919	858	846	−73	−8
Proprietary	245	230	231	−14	−6
NONHOSPITAL FACILITIES					
Total	1,127	1,208	1,254	127	11
Clinics	478	511	531	61	13
Caseload<400	105	111	102	−3	−3
Caseload≥400	365	400	429	64	18
MDs' offices	667	697	723	66	10
Caseload<400	550	573	582	42	8
Caseload≥400	107	124	131	24	22

*Less than one percent.

and Louisiana, Massachusetts, Minnesota and North Dakota require parental notification or consent, with the provision that a minor may seek the authorization of a judge as an alternative to parental involvement. Court authorization is granted if the judge determines that the teenager is mature enough to make an informed decision or, if she is not, that the abortion would be in her best interest. Although in Massachusetts almost all minors who seek court permission are granted it, the procedure subjects them to stress and anxiety, and may inhibit some from seeking abortion services.[16]

To assess the probable impact of parental notification and consent requirements, the AGI study referred to earlier[17] also surveyed minors obtaining abortions in a national sample of abortion clinics. Fifty-five percent of respondents said that one or both parents knew about their abortions, but 23 percent said that they would avoid having a legal abortion if their parents had to be told. (They were not asked about the option of obtaining court approval of the abortion without parental knowledge.) Of those who said that they would not have a legal abortion, 39 percent said they would have a self-induced or illegal abortion; 39 percent said that they would continue their pregnancies; nine percent, that they would leave home; 13 percent did not know what they would do.

A similar study found that three-quarters of a sample of 163 Minnesota teenagers under age 18 who were obtaining abortions had not told one or both parents about their abortions and therefore would be affected by a law requiring the consent of both parents.[18] Furthermore, 40 percent thought they could not get the consent of both parents and 42 percent said they would not get a legal abortion if parental notification were required. Those who would not seek a legal abortion under parental notification requirements said they would go to another state for an abortion (44 percent), continue the pregnancy (29 percent), leave home (16 percent) or seek an illegal abortion (11 percent).

• *Medicaid funding restrictions.* For poor women, the cost of an abortion may be a serious impediment to the utilization of abortion services. Until late in 1977, when the Hyde Amendment severely limited federal participation in Medicaid funding of abortions, Medicaid paid for abortions for significant numbers of poor women in many states. Since 1977, the number of Medicaid-funded abortions has been reduced as a consequence of the Hyde Amendment and of the policy of most states to adopt similar restrictions. The number of Medicaid abortions fell from 295,000 in FY 1977 to 194,000 in FY 1978 and 209,000 in FY 1979.[19] The number would have fallen more had a few of the states serving large numbers of Medicaid patients—notably California and New York—not continued to pay for Medicaid abortions. In addition, many of the states that adopted the restrictions had, in fact, been paying for abortions for only a fraction of the Medicaid-eligible women estimated to be in need of abortion services.*

As a result of the cutbacks in public funding of abortion, many poor women have found access to abortion services more difficult or impossible. The most extensive study of the importance of Medicaid funding found that between 18 and 23 percent of Medicaid-eligible women who would have obtained abortions when Medicaid funding was available instead carried their pregnancies to term when that funding was cut off.[20]

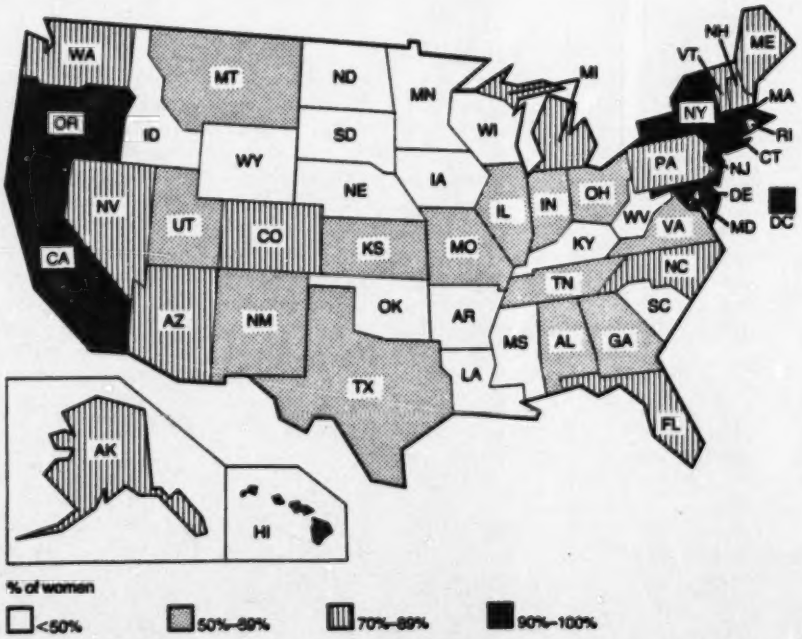
As of December 1981, 14 states and the District of Columbia were continuing to fund medically necessary abortions under Medicaid, even though federal funds for most of these abortions are no longer available. It is the policy of nine states—Alaska, Colorado, Hawaii, Maryland, Michigan, New York, North Carolina, Oregon and Washington—

Table 8. Number and percentage distribution of reported abortions, by type of facility,* 1973, 1978, 1979 and 1980

Type of facility	No. of abortions				% distribution			
	1973	1978	1979	1980	1973	1978	1979	1980
U.S. total	744,600	1,409,600	1,497,670	1,553,890	100	100	100	100
Hospitals	385,920	350,520	347,970	341,030	52	25	23	22
Public	83,110	76,430	73,150	68,660	11	5	5	4
Private	302,810	274,090	274,820	272,370	41	20	18	18
Nonhospital facilities	358,680	1,059,080	1,149,700	1,212,860	48	75	77	78
Clinics	343,470	998,850	1,086,920	1,145,090	46	71	73	74
Physicians' offices	15,210	60,230	62,780	67,770	2	4	4	4

*In this and subsequent tables, physicians' offices reporting 400 or more abortions a year are classified as clinics.

Map 1. Percentage of women aged 15–44 living in counties with abortion facilities, by state, 1980



*For details see: AGI, *Abortions and the Poor: Private Morality, Public Responsibility*, New York, 1979, p. 14.

Table 9. Percentage distribution of responding nonhospital clinics performing abortions, by types of services provided, according to caseload, 1980

Types of services provided	% of clinics, by caseload			
	Total	<400	400–990	≥1,000
	(N= 431)	(N= 73)	(N= 69)	(N= 289)
Primarily or exclusively abortions	66	14	53	82
General ob-gyn services	20	46	25	13
General fertility services	4	3	10	3
General medical care	6	23	9	1
Other	4	14	3	1

and of the District of Columbia to fund medically necessary abortions. California and Massachusetts are continuing to fund medically necessary abortions under final court order of their state supreme courts, which have held that such funding is required under the state constitution. Connecticut, New Jersey and Pennsylvania are under interim court order by state courts to fund abortions under Medicaid.[21]

Table 10. Percentage of responding hospital abortion facilities that serve new self-referred patients, by caseload, according to hospital type, 1980 (number of hospitals in each cell shown in parentheses)

Caseload	Hospital type					
	Total		Public		Private	
Total	26	(861)	34	(205)	23	(656)
<400	19	(759)	26	(180)	17	(579)
≥400	72	(102)	88	(25)	66	(77)

Table 11. Percentage distribution of responding physicians' practices reporting office abortions, by type of referrals accepted, according to caseload, 1980

Type of referral	% of practices, by caseload			
	Total	<30	30–390	≥400
Accept referrals from other physicians or facilities	(N= 641)*	(N= 108)	(N= 415)	(N= 118)
Yes, routinely	93	81	95	98
Yes, under special circumstances	5	12	4	0
No	2	7	1	2
Accept new self-referred patients	(N= 636)	(N= 108)	(N= 412)	(N= 116)
Yes, routinely	91	80	93	96
Yes, under special circumstances	6	12	5	3
No	3	8	2	1
Total	100	100	100	100

*Number of practices responding to questionnaire.

Since Medicaid is a joint federal-state program, Medicaid-eligible women seeking health care such as abortion services must obtain those services in their home state. Their ability to travel across state lines to avoid restrictions such as parental notification or consent requirements or gestational age limitations is therefore curtailed, and they are affected by problems of service availability and accessibility to a greater extent than are higher income women.

• *Hospital outpatient abortion services.* Another factor affecting the cost of abortions is the dearth of outpatient abortion services in hospitals. In many hospitals, abortions are available only as costly inpatient procedures that involve payment usually for at least one day of hospitalization as well as operating room and physician charges. These fees, added to time lost from work or other responsibilities, represent a formidable financial obstacle for women with limited incomes.

Data available from 60 percent of hospitals (which reported 54 percent of all hospital abortions) indicate that only 55 percent of hospital abortion providers perform any outpatient abortions, and 55 percent of hospital abortions occur as outpatient procedures.

• *Acceptance of self-referred patients.* Because of the way U.S. hospitals are structured, most do not provide services directly to the public.* They simply permit their facilities to be used by attending physicians who provide medical care (sometimes including abortion services) to their own patients. This being the situation, even if a woman lives in an area with a hospital where abortions are performed, the chances are that she will not be able to arrange directly with the hospital to obtain an abortion. She will usually be told to seek this care from a private physician or, at most, will be referred to a specific physician who may be willing to perform an abortion in the hospital.

In the 1981 AGI survey, hospitals were asked whether they accept self-referred abortion patients for service. Of the hospital providers answering the question, only 26 percent responded in the affirmative, as Table 10 shows. The proportion is somewhat higher for public hospitals (34 percent) than for private hospitals (23 percent). Among providers performing 400 or more abortions a year, the majority (72 percent) accept self-referred patients; most of these presumably have organized abortion clinics. A large majority of hospital providers, however, have small caseloads (87 percent report fewer than 400 abortions in 1980), and only 19 percent of these accept self-referred patients. Often, then, a women cannot arrange directly with a hospital to obtain an abortion but must have as an intermediary an attending physician willing to accept her as a patient.

Table 12. Percentage distribution of abortion facilities, by the maximum gestation at which the facility will provide abortions, according to type of facility, 1980

Maximum gestation (weeks LMP)	All facilities (N= 1,918)	Hospitals (N= 824)	Clinics (N= 565)	MDs' offices (N= 529)
5–6	3	3	*	7
7–8	12	11	2	22
9–10	15	15	9	23
11–12	37	34	43	35
13–14	12	5	27	9
15–16	4	4	8	1
17–20	11	18	8	3
≥21	6	10	3	*
Total	100	100	100	100

*Less than one percent.

Most physician facilities, on the other hand, accept self-referred abortion patients. As Table 11 shows, of the practices responding to the survey question, 93 percent routinely accept referrals from other physicians or facilities and 91 percent accept new self-referred patients. Even among practices that perform fewer than 30 office abortions per year, 80 percent accept new self-referred patients. It can be assumed that nearly all clinics offering abortion services accept self-referred patients, with the exception of group health plans serving only enrolled members.

• *Limitations on gestation.* If a woman does not discover her pregnancy early in gestation, or if she delays seeking an abortion, she will find that she is limited in the facilities willing to provide abortion services to her. Even within the first trimester of pregnancy, some providers restrict abortions to women whose pregnancy has lasted less than 10, eight, or even six weeks from the last menstrual period (LMP).

Respondents were asked, "What is generally the maximum gestation (in weeks since last menstrual period) of abortions provided in the hospital [in your facility, in your office]?" Since some responses were outside the expected range, a small sample of facilities were resurveyed to verify their answers. This check revealed that some respondents had reported weeks of conceptional age rather than weeks since LMP. In addition, some respondents, particularly those in the medical records departments of hospitals, had

*Some hospitals do have emergency rooms that respond directly to the public. And some have a variety of clinics, such as well-baby and prenatal clinics, that are open, in general, to publics within their own catchment area.

misunderstood the question or the facility's policy. However, the results are useful in that they reflect the general pattern of policies regarding gestation.

The responses suggest that many facilities restrict their services to early gestations. Fifty-two percent of the physicians and 29 percent of the hospitals ordinarily provide abortions only to women at 10 or fewer weeks' gestation (see Table 12). Some of the physicians apparently perform only menstrual regulation, which is included in the definition of abortion used by the AGI survey—seven percent of responding physicians report providing abortions only up to six weeks LMP. Relatively few physicians—about 13 percent—perform abortions in their offices past 12 weeks LMP. A very few physicians perform abortions in their offices past 16 weeks; some of these may initiate instillation abortions in their offices to be completed in a hospital.

Twenty-seven percent of the clinics say their cutoff point is 13 or 14 weeks. Most of these consider abortions at 14 weeks LMP to be first-trimester procedures, since this age equals 12 weeks postconception. Nineteen percent of clinics and 32 percent of hospitals perform abortions past 14 weeks LMP.

References

1. Centers for Disease Control, DHHS, *Abortion Surveillance, Annual Summary, 1978*, Atlanta, 1980.

2. S. K. Henshaw, J. D. Forrest, E. Sullivan and C. Tietze, *Abortion 1977–1979: Need & Services in the United States, Each State & Metropolitan Area*, The Alan Guttmacher Institute (AGI), 1981.

3. Ibid., p. 6.

4. AGI, *Data and Analyses for 1980 Revision of DHHS Five-Year Plan for Family Planning Services*, New York, 1981; and M. Zelnik and J. F. Kantner, "Sexual Activity, Contraceptive Use and Pregnancy Among Metropolitan-Area Teenagers: 1971–1979, *Family Planning Perspectives*, 12:230, 1980.

5. M. Zelnik and J. F. Kantner, 1980, op. cit.

6. K. Ford, "Contraceptive Use in the United States, 1973–1976," *Family Planning Perspectives*, 10:264, 1978.

7. S. K. Henshaw et al., 1981, op. cit., p. 15.

8. W. Cates, Jr., K. F. Schulz, D. A. Grimes and C. W. Tyler, Jr., "The Effect of Delay and Method Choice on the Risk of Abortion Morbidity," *Family Planning Perspectives*, 9:266, 1977.

9. B. L. Lindheim, "Services, Policies and Costs in U.S. Abortion Facilities," *Family Planning Perspectives*, 11:283, 1979.

10. FY 1980: Department of Defense appropriations, Public Law 96-86.

11. D. A. Grimes, W. Cates, Jr., and C. W. Tyler, Jr., "Comparative Risk of Death from Legally Induced Abortion in Hospitals and Nonhospital Facilities," *Obstetrics and Gynecology*, 51:323, 1978.

12. D. A. Grimes, W. Cates, Jr., and R. M. Selik, "Abortion Facilities and the Risk of Death," *Family Planning Perspectives*, 13:30, 1981.

13. B. L. Lindheim, 1979, op. cit.

14. American Medical Association, *Physician Distribution and Medical Licensure in the United States, 1979*, Chicago, 1980.

15. A. Torres, J. D. Forrest and S. Eisman, "Telling Parents: Clinic Policies and Adolescents' Use of Family Planning and Abortion Services," *Family Planning Perspectives*, 12:284, 1980.

16. P. Donovan, "Your Parents or the Judge: Massachusetts' New Abortion Consent Law," *Family Planning Perspectives*, 13:224, 1981.

17. A. Torres et al., 1980, op. cit.

18. Affidavit of R. Anderson, submitted in Hodgson v. Minn. (U.S.D.C., Minn.), 1981.

19. S. K. Henshaw et al., 1981, op. cit., p. 63.

20. J. Trussell, J. Menken, B. L. Lindheim and B. Vaughan, "The Impact of Restricting Medicaid Financing for Abortion," *Family Planning Perspectives*, 12:120, 1980.

21. R. B. Gold, AGI, personal communication, Dec. 1981.

Document #8

SOUNDING BOARD

REGULATION OF ABORTION SERVICES — FOR BETTER OR WORSE?

Two different approaches are currently being used in the United States to limit the availability of legal abortions — restriction of public funds for abortion[1] and regulation of conditions under which abortions can be performed. Regarding the latter, legislation has been introduced at local, state and national levels to regulate abortion services. The prototype for this legislation was initially introduced as a city ordinance in Akron, Ohio.[2] The alleged purposes of this kind of legislation are to provide more comprehensive information for women considering termination of pregnancy and thus allow "informed consent" and, secondly, to guard the health of women who choose to obtain an abortion by providing safer conditions for the procedure.

One or more laws like that in Akron have been introduced in at least 26 states and nine municipal areas in the country. Moreover, a proposed United States Senate Bill ("Alternatives to Abortion Act of 1978") defines the counseling procedures to be used in abortion facilities.[3] Finally, amendments to forbid abortion counseling and to require parental notification have been proposed for the Title X Family Planning Bills in the past two sessions of Congress.[4] Thus, although initiated as a local ordinance, the regulations in Akron may have a national impact.

In this article, we summarize the content and scope of these regulations, describe the problems arising from their informed-consent provisions, discuss their possible consequences on health and suggest ways to determine their actual effects.

Content and Scope of Akron Regulations

This legislation does not involve either the funding of legal abortions or the provision of other health services. Rather, the Akron statute specifies the type of information that must be transmitted to every woman seeking an abortion, and it also dictates the medical practices that must be followed by every facility providing abortions. Moreover, it applies to all women seeking abortions and to all abortion facilities operating within the specific jurisdiction of the local or state government where the legislation has been proposed; unlike the funding restriction, it does not primarily apply to women in low-income groups.

The Akron-type regulations contain five main provisions that affect the delivery of abortion services:

Informed Consent

The prototype Akron regulation[2] requires that abortion be described to the woman as a "major surgical procedure" and mandates that she be warned of the variety of serious physical and mental complications that may result, including "sterility, miscarriage and prematurity in subsequent pregnancies." No description of the risks of the alternatives to legally induced abortion is required. Moreover, according to the regulation the woman must be given a detailed description of the anatomic and physiologic characteristics of the fetus at the gestational age when the abortion is to be performed.

Waiting Period

The Akron ordinance[2] requires at least a 24-hour waiting period between obtaining the consent of the woman after counseling and performing the abortion. Other statutes require waiting periods of up to 48 hours.[3]

Parental Notification

The Akron ordinance[2] requires that, if the pregnant woman is under 18 years of age and unmarried, her parents or guardian must be notified at least 24 hours before the procedure. If they cannot be located, a 72-hour waiting period is required to allow a certified notification to reach their last known address.

Abortion Methods

Although the Akron ordinance does not attempt to regulate the method of abortion, similar laws have proscribed the use of agents such as hypertonic saline or hyperosmolar urea for instillation abortions because of their adverse effects on the fetus in utero.[5]

Abortion Facilities

The Akron ordinance requires all abortions to be performed in a hospital after 12 weeks of gestation.

Problems in the Information Provided to Obtain Informed Consent

Securing the patient's informed consent for any medical or surgical treatment requires providing accurate and complete information about the treatment itself, its alternatives, its benefits and its risks.[7,8] Although the Akron requirements are supposedly intended to educate the patient, the risks associated with the procedure are overstated, a description of the alternatives is neglected and there is a bias in favor of continuation of the pregnancy.

Like any operative intervention, induced abortion has definite risks, but most physicians would disagree with the idea of labeling an abortion a "major surgical procedure." The term "major surgery" is so vague that members of the American College of Surgeons are unable to agree on an adequate definition and have not used it for the past decade.[9] Moreover, the American College of Obstetricians and Gynecologists has specifically referred to dilatation and curettage (the most common method of abortion) as "minor gynecologic operations."[10] Underscoring this point, the Patient Information Booklet prepared by the Com-

Reprinted by the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE

Reprinted from the *New England Journal of Medicine*
301:720-723 (September 27), 1979

mittee on Patient Education of the American College of Obstetricians and Gynecologists states that "elective termination of pregnancy is a remarkably safe operation."[11]

Comparative mortality statistics reflect the relative safety of legally induced abortion. The rate of death from legally induced abortion is three per 100,000 procedures — a rate below that in other common operations, such as tonsillectomy.[12] Moreover, abortions performed before the 13th week of pregnancy carry a risk of death similar to that of the intramuscular injection of penicillin as a treatment for gonorrhea.[13] Thus, the use of the term "major surgery" to describe induced abortion to the patient is misleading.

The main problem of the Akron regulation, however, is its failure to discuss the alternatives to abortion fully. For a pregnant woman considering abortion, the alternative to termination of the pregnancy is continuation. In terms of risk of death, termination of the pregnancy before 16 weeks of gestation is seven times safer than continuation of the pregnancy to term, even after one controls for age and race.[14] Moreover, continuation results in an estimated 10 to 15 per cent incidence of abdominal operations such as cesarean section,[15] whereas legal abortion results in abdominal operations in only 0.1 to 0.2 per cent of cases[14]; thus, the risk of these complications is 50 to 150 times higher if a woman continues her pregnancy.

The Akron ordinance also exaggerates the psychologic sequelae of abortion. Although most women experience some psychologic reactions to terminating a pregnancy, these reactions are generally not as frequent or severe as the psychologic effects of continuing an unplanned or unwanted pregnancy.[11]

In addition to amplifying the short-term risks associated with abortion and ignoring those associated with continuation of a pregnancy, the Akron regulation misrepresents the possible long-term complications. Adverse outcomes of pregnancies months or years after an induced abortion are presented to the patient as if they had been proved, without considering the conflicting conclusions in the many published studies.[16] Recent reports from the World Health Organization[17] and Kaiser-Permanente, the latter to be found in the paper by Harlap and her colleagues elsewhere in this issue, have suggested that the degree of dilatation and the method of abortion may be important factors in the outcome of future pregnancies. These data imply that suction curettage, the procedure used for over 90 per cent of abortions in the United States,[20] presents little or no threat to future pregnancies. Other published studies in this country[21,22] have shown no association between induced abortions and outcome of subsequent pregnancies. Thus, the required explanations distort the known long-term risks associated with the most common abortion procedure in the United States.

The required description of fetal development during the counseling session before abortion does not pertain directly to the abortion procedure and represents an attempt to bias the patient to choose continuation of the pregnancy over termination. Fetal morphology is rarely relevant to a woman obtaining an abortion, since she will probably not have the opportunity or desire to view any fetal tissue. Instead, this description is likely to increase the anxiety and guilt feelings of women, who rarely take lightly the decision to terminate a pregnancy and are already susceptible to these emotions; psychologic trauma may result.[23,24]

Possible Consequences

Delaying an abortion adds directly to the risks of complications and death for the pregnant woman.[14,25] Although the one- to two-day delay required by the regulations may not seem very long, this time interval is often expanded because of the woman's work or school schedule, the facility's backlog in appointments or the facility's system of scheduling abortions only on specific days.[26]

Provisions for parental notification create additional delays for many pregnant teen-agers because anxiety about informing their parents leads to conflict in decision making.[27] Teen-agers as a group already obtain abortions later in gestation than do older women,[14] and fear of telling their parents, even without this requirement, has an important role in this delay.[27]

The most important risk variable in the morbidity and mortality associated with abortion is gestational age.[25] Between seven and 20 weeks of gestation, the risk of complications increases approximately 20 to 30 per cent[25] and the risk of death increases approximately 50 per cent, each week that the abortion is delayed.[14] Therefore, any action that results in delaying the abortion adds a small but definite increase in the risk of morbidity and mortality to the pregnant woman. Rather than contributing to the safety of the abortion procedure for the woman, the waiting period and parental-notification provisions actually add to its dangers.

Current data show that some agents, such as hypertonic saline or hyperosmolar urea, that have been restricted by some regulations may involve less risk to the woman than do other agents, such as prostaglandins, that have no documented effect on the fetus.[28] Thus, requiring the use of nonfeticidal agents may pose a greater threat to the health of the woman undergoing the abortion than would other methods to terminate the pregnancy.

Comparative data are not available to use in evaluating the requirement that all abortions occurring after 12 weeks of gestation be performed in a hospital. At 12 weeks or less, death-to-case rates are

similar in hospitals and other facilities.[29] Moreover, case-series reports have documented that some operators can safely perform uterine-evacuation procedures at 13 to 16 weeks in ambulatory clinics,[30,31] thus decreasing the cost and inconvenience to the patient and eliminating the unnecessary use of hospital beds. On the basis of these favorable reports, the Planned Parenthood Federation of America has advanced the gestational age limit to 18 weeks in its ambulatory clinics. The requirement that all abortions after 12 weeks of gestation be performed in a hospital will directly increase the expense and inconvenience to the woman, without making any evident contribution to the safety of the procedure.

Approaches to Monitoring the Effects of the Regulations

Several approaches can be used to determine whether regulations like those in Akron will have any impact on abortion services.

Surveillance of the Number of Women Obtaining Legally Induced Abortions

Annual and seasonal trends in the number of women obtaining legally induced abortions may indicate whether provisions for informed consent or parental notification have dissuaded women from seeking legally induced abortions.

Surveillance of the Number of Live Births

Annual and seasonal patterns in live births approximately six months after the enactment of regulations on abortion may indicate whether women are continuing their pregnancies to term, rather than terminating them by legally induced abortion.

Surveillance of the Characteristics of Women Obtaining Legally Induced Abortions

Changes in the age, race or marital status of women seeking abortions may indicate population groups that are being differentially affected by the regulations; for example, the parental-notification requirement may influence the proportion of teenagers who seek and obtain legally induced abortion.

Surveillance of the Characteristics of Women Giving Birth

Likewise, any changes in the age, race or marital status of women giving birth approximately six months after the enactment of regulations may indicate population groups that are continuing their pregnancies to term.

Surveillance of Gestational Age in Legally Induced Abortions

The gestational age at the time of the abortion may be affected by the mandatory waiting period; gestational age has proved to be the most sensitive indicator of the impact on health of restricting public funds for abortion.[32]

Surveillance of Complications

The number of complications after legally induced abortions may increase if the regulations cause women to delay abortions or cause physicians to use less safe methods. Likewise, the number of complications from illegal abortions may increase if the regulations lead a sizable proportion of women to seek abortions from persons who are not physicians. Alternatively, if a large proportion of women continue their pregnancies to term and the number obtaining abortion declines, the number of complications from abortion will decline as well.

Detailed Interviews

In-depth interviews with women who request abortions may determine whether the informed-consent provisions have affected the decision. Their responses and their postabortion adjustment can be compared with those of women outside the jurisdictional range of the regulations, to learn whether there are measurable differences.

The above suggestions represent basic epidemiologic approaches to monitoring the impact of any change in public policy on health in the community where the policy is instituted. Ideally, the community will already have surveillance mechanisms to allow temporal comparisons before and after the enactment of regulations like those in Akron. At a national level, the Center for Disease Control has been monitoring the number and characteristics of women obtaining legally induced abortions since 1969. This surveillance has allowed us to evaluate the effects of the many legislative and judicial decisions affecting abortion. We will use similar approaches to determine whether the proposed regulations have a national impact on health.

Conclusion

The issue of induced abortion raises profound ethical questions. Indeed, the controversial nature of the subject is one reason why more is known about the epidemiology of induced abortion than any other surgical procedure. The data do not answer society's dilemma, but they may be helpful to the woman attempting to choose whether to terminate or continue an unplanned pregnancy. Information should be

presented in a neutral manner, without overtones favoring either termination or continuation of the pregnancy. No woman should be persuaded to have an abortion if she does not want one; neither should she be persuaded to continue her pregnancy if she would rather terminate it.

Current state and local statutes that seek to regulate abortion under the guise of ensuring adequate patient education or improving the safety of the procedure or both could have the opposite effects. First of all, patients will be given incomplete and inaccurate information. Secondly, they will be required to delay the abortion procedure and thereby increase the associated risks. Finally, at later gestational ages, particular abortion methods that are not necessarily the safest for the woman will be mandated. The effect of these regulations could be to endanger rather than protect the health of American women who seek to end unwanted pregnancies.

WILLARD CATES, JR., M.D., M.P.H.
JULIAN GOLD, M.D.
RICHARD M. SELIK, M.D.

Center for Disease Control
Atlanta, GA 30333

REFERENCES

1. Berger LR: Abortions in America: the effects of restrictive funding. N Engl J Med 298:1474-1477, 1978
2. City of Akron (Ohio) City Council: Regulation of Abortions. Ordinance passed February 28, 1978
3. Alternatives to Abortion Act (S. 2614). Introduced to the United States Senate, March 1, 1978
4. Rosoff JI: Abortion foes take aim at family planning program, plan crippling riders to Title X, Planned Parenthood-World Population Washington Memo. Washington, DC, The Alan Guttmacher Institute, October 9, 1978, pp 1-2
5. Neb. legislature approves revised abortion measure. Washington Post, March 20, 1979, p A9
6. An Act to regulate abortions. New Jersey State Senate Bill No. 1110. Introduced April 24, 1978
7. Freund PA: Ethical problems in human experimentation. N Engl J Med 273:687-692, 1965
8. Beecher HK: Ethics and clinical research. N Engl J Med 274:1354-1360, 1966
9. Zintel HA: Assistant to the surgeon at operation. Presented at a meeting of the American College of Surgeons, February, 1977
10. Committee on Professional Standards: Standards for Obstetric-Gynecologic Services. Chicago, American College of Obstetricians and Gynecologists, 1974
11. Committee on Patient Education: Abortion — Patient Information Booklet. Chicago, American College of Obstetricians and Gynecologists, 1978
12. Cates W Jr, Grimes DA, Smith JC, et al: Legal abortion mortality in the United States: epidemiologic surveillance, 1972-1974. JAMA 237:452-455, 1977
13. Cates W Jr, Grimes DA, Smith JC: Abortion as a treatment for unwanted pregnancy: the number two sexually-transmitted condition. Adv Plann Parent 12:115-121, 1978
14. Cates W Jr, Tietze C: Standardized mortality rates associated with legal abortion: United States, 1972-1975. Fam Plann Perspect 10:109-112, 1978
15. Jones OH: Cesarean section in present-day obstetrics. Am J Obstet Gynecol 126:521-530, 1976
16. Grimes DA, Cates W Jr: Complications from legally induced abortion: a review. Obstet Gynecol Surv 34:177-191, 1979
17. Brewer C: Incidence of post-abortion psychosis. Br Med J 1:476-477, 1977
18. Cates W Jr: Late effects of induced abortion: hypothesis or knowledge? J Reprod Med 22:207-212, 1979
19. Gestation, birth-weight, and spontaneous abortion in pregnancy after induced abortion: report of a collaborative study by W. H. O. Task Force on Sequelae of Abortion. Lancet 1:142-145, 1979
20. Center for Disease Control: Abortion Surveillance, 1976 (DHEW Publication No. [CDC] 78-8205). Atlanta, Georgia, Center for Disease Control, 1978
21. Daling JR, Emanuel I: Induced abortion and subsequent outcome of pregnancy in a series of American women. N Engl J Med 297:1241-1245, 1977
22. Kline J, Stein Z, Susser M, et al: Induced abortion and spontaneous abortion: no connection? Am J Epidemiol 107:290-298, 1978
23. Freeman EW: Abortion: subjective attitudes and feelings. Fam Plann Perspect 10:150-155, 1978
24. Francke LB: The Ambivalence of Abortion. New York, Random House, 1978
25. Cates W Jr, Schulz KF, Grimes DA, et al: The effect of delay and choice of method on the risk of abortion morbidity. Fam Plann Perspect 9:266-273, 1977
26. Lerner RC, Bruce J, Ochs JR, et al: Abortion programs in New York City: services, policies, and potential health hazards. Milbank Mem Fund Q 52:15-38, 1974
27. Fielding WL, Sachtleben MR, Friedman LM, et al: Comparisons of women seeking early and late abortion. Am J Obstet Gynecol 131:304-310, 1978
28. Grimes DA, Schulz KF, Cates W Jr, et al: Midtrimester abortions by intraamniotic prostaglandin $F_{2\alpha}$: safer than saline? Obstet Gynecol 49:612-616, 1977
29. Grimes DA, Cates W Jr, Tyler CW Jr: Comparative risks of death from legally induced abortion in hospitals and nonhospital facilities. Obstet Gynecol 51:323-326, 1978
30. Burnhill MS: Vaginal second-trimester abortion, Risks, Benefits, and Controversies in Fertility Control. Edited by JJ Sciarra, JJ Speidel, G Zatuchni. Hagerstown, Maryland, Harper & Row, 1978, pp 331-347
31. Horn WM, Oakes AG: Multiple laminaria treatment in early mid-trimester outpatient suction abortion: a preliminary report. Adv Plann Parent 12:93-97, 1977
32. Cates W Jr, Kimball AM, Gold J, et al: The health impact of restricting public funds for abortion: October 10, 1977-June 10, 1978. Am J Public Health 69:945-947, 1979

*Copyright, 1979, by the Massachusetts Medical Society
Printed in the U.S.A.

Document #9

Reprinted by the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE

10 Dilatation and Evacuation

David A. Grimes
Willard Cates, Jr.

Three general approaches exist for emptying the uterus during the second trimester of pregnancy: hysterotomy, induction of labor, and dilatation and evacuation (D&E). Each of these methods of abortion shares two features: 1) a portal of exit, and 2) expulsive or tractile force on extraction to evacuate the uterine contents.

With hysterotomy, the physician creates a surgical opening in the uterus, manually empties the cavity, and repairs the wound. Because of high morbidity and mortality, prohibitive cost, and prolonged recuperation, hysterotomy has been virtually abandoned as a primary abortion method in the United States.[1]

Induction of premature labor attempts to generate expulsive forces which enlarge the natural anatomic opening of the uterus as well as expel the products of conception. Chemical insults to the feto-placental unit or administration of prostaglandins initiate uterine contractility in the second trimester. Teleologically, however, the uterus has evolved to retain its contents tenaciously at this stage of pregnancy, while reserving the capacity to expel defective pregnancies in

the first trimester and viable fetuses later on in the third. Thus, the second trimester is the least physiologic time during pregnancy for the uterus to empty itself.

Induction of labor in the second trimester often is slow, unpredictable, and painful. In addition to the side effects and hazards associated with the abortifacient agents themselves, women undergoing second-trimester abortion by labor induction also incur risks generally associated with parturition, such as amniotic fluid embolism.[2]

Dilatation and evacuation incorporates certain advantages of hysterotomy and labor induction. The principal advantage D&E shares with hysterotomy is that the evacuation procedure is brief and definitive; like abortion by labor induction, D&E uses the dilated cervix as the portal of egress. Traction (rather than expulsion) is the means by which the cavity is evacuated. D&E thus provides a faster, safer, and more comfortable abortion than alternative methods. This chapter will document the use of second-trimester D&E in the United States, describe current techniques, review the safety of the method, and then compare D&E with its alternatives.

USE OF SECOND-TRIMESTER DILATATION AND EVACUATION IN THE UNITED STATES

Dilatation and evacuation has become one of the two most frequently used methods of abortion in the second trimester. According to data provided to the Center for Disease Control (CDC) by 28 states,[1] D&E accounted for 38.7% of all abortions in 1977 at ≥ 13 weeks' gestation (Table 10-1). Intrauterine saline instillation accounted for 38.3%, while intrauterine prostaglandin $F_2\alpha$ ($PGF_2\alpha$) administration accounted for 16.6%.

Table 10-1
Reported Legal Abortions at ≥ 13 Weeks' Gestation by Type of Procedure,* United States, 1977

Type of Procedure	Number	%
Dilatation and evacuation	17,590	38.7
Intrauterine saline instillation	17,441	38.3
Intrauterine prostaglandin instillation	7534	16.6
Hysterotomy/hysterectomy	399	0.9
Other	2170	4.8
Unknown	367	0.8
Total	45,501	100.0

*Based on data from 28 states; excludes abortions with gestational age not specified.
Source: Center for Disease Control, *Abortion Surveillance 1977*, Atlanta, issued September, 1979, Table 18.

In 1977, D&E was the predominant method of abortion in the 13- to 15-week interval (73.3%). Both saline and $PGF_2\alpha$ instillation were used more frequently in the 16- to 20-week interval (50.1% and 25.7%, respectively), with D&E accounting for only 16.7% of cases. At 21 weeks' gestation, saline instillation remained the predominant method (64.3%), with D&E and $PGF_2\alpha$ responsible for nearly equal proportions (12.7% and 12.6%, respectively). The predominance of D&E in the 13- to 15-week interval may be due in large part to the technical difficulty of performing an amniocentesis for instillation of abortifacients until the uterus is approximately 16 weeks in size.

CURRENT TECHNIQUES OF SECOND-TRIMESTER DILATATION AND EVACUATION

Although the upper gestational age limit for D&E abortions may be as high as 24 weeks (Table 10-2), the majority of these operations take place earlier in the second trimester (Table 10-3). The predominance of earlier second-trimester D&E abortions reflects the gestational ages at which women request abortion (Figure 10-1). Adherence to a 12-week limit for curettage abortions artifactually skews the gestational age distribution of women obtaining second-trimester abortions.[3] For women requesting abortion at 13- to 15-weeks' gestation, use of D&E obviates the need for costly and hazardous delays until 16 weeks or later for amnioinfusion abortion.[4] In general, the incidence of second-trimester abortion should be inversely proportional to gestational age, with the exception of small but important numbers of abortions which occur late because of the need to obtain antenatal diagnoses of fetal defects.

Second-trimester D&E abortions are performed on an outpatient basis in both hospitals and free-standing clinics (Table 10-2). Low morbidity rates have been reported from both types of facilities, and no presently available data support the suggestion to limit performance of such abortions to hospitals (Table 10-3). One clinic[5] has challenged a state regulation restricting abortions beyond 12 weeks' gestation to hospitals. In 1979 the National Medical Committee of Planned Parenthood Federation of America authorized performance of second-trimester D&E abortions in nonhospital facilities of selected affiliates.

Many physicians performing second-trimester D&E abortions do not routinely obtain ultrasound estimates of gestational age. Rather, ultrasonography is reserved for clinical indications such as marked discrepancies between menstrual history and estimated uterine size. Other physicians routinely use ultrasound to corroborate gestational age for those women near the upper gestational age limit for D&E abortions. Still others use this diagnostic examination for all

Table 10-3
Studies of Dilatation and Evacuation Procedures, United States

Study	Date	Type Study	No. of Patients (Weeks' Gestation)	Findings
Tietze and Lewit[17,33]	1972 (D&E) 1973 (saline)	Multicenter, prospective, cohort, nonrandomized	N = 2734 2317 (13–14) 417 (15+)	Complication rates increase with increasing gestational age. Total complications for D&E fewer than saline at all gestations.
Stewart and Goldstein[34]	1972	Case series	N = 195 180 (13–14) 15 (15–16)	Complication rates increase with gestational age. No comparison of D&E and saline complications.
Brenner and Edelman[18] (includes data from US, England, India, and Singapore)	1974	Multicenter, prospective, cohort, nonrandomized	N = 338 (13–15)	Complication rates with sharp curettage through 15 weeks similar to saline at later gestations. Suction curettage alone had higher complication rates than sharp curettage alone.
Koplik[20]	1975	Case series	N = 141 95 (13–14) 46 (> 14)	No significant difference in complications by gestational age.
DeLee[35]	1976	Case series	N = 47 28 (14–16) 12 (17–19) 6 (20–22) 1 (23–24)	No major complications. One minor complication of fever.
Grimes, et al[20]	1977	Multicenter, prospective, cohort, nonrandomized	N = 6213 5632 (13–16) 581 (17–20)	Major complications for D&E 60% lower than for saline instillation.

Table 10-3 *(continued)*
Studies of Dilatation and Evacuation Procedures, United States

Study	Date	Type Study	No. of Patients (Weeks' Gestation)	Findings
Smith, Steinhoff and Palmore[10]	1978	Multicenter, prospective, cohort, nonrandomized	N = 721 696 (13–16) 25 (17–20)	Complication rates with D&E in 13 to 16-week range less than instillation procedures later.
Stubblefield, et al[11]	1978	Case series	N = 73 21 (13) 20 (14) 20 (15–16) 12 (17–18)	No major complications. Larger cannula had greater blood loss at lower gestational ages, but faster and more complete uterine evacuation.
Barr[14]	1978	Case series	N = 900 48.3% (18–20)	Major complication rate 0.44/100 D&E procedures. Two uterine perforations.
Glick and Sacks[27]	1978	Case series	N = 1074 334 (< 15) 289 (16) 267 (17–18) 156 (19–20) 23 (21–22) 5 (23–24)	Major complication rate 0.55/100 D&E procedures. Five cases of DIC, 1 recognized perforation.
Hanson[8]	1978	Case series	N = 3123 819 (14) 673 (15) 465 (16) 281 (17)	Major complication rate of 0.2%.

Study	Date	Type Study	No. of Patients (Weeks' Gestation)	Findings
Hanson[8] *(continued)*			332 (18) 246 (19) 200 (20) 21 (21)	
Berry and Peterson[32]	1978	Case series	N = >5000	Rate of uterine perforation < 0.4/100, transfusion < 0.1/100, infection 0.3/100.
Hodari, et al[30]	1977	Case series	N = 2490 1144 (15) 1012 (16) 267 (17) 57 (18) 7 (19) 3 (20)	Major complication rate of 1.65/100 D&E procedures. Total complication rate of 2.77/100 D&E procedures.
Hern and Oakes[9]	1977	Case series	N = 150 45 (13) 35 (14) 44 (15) 16 (16) 5 (17) 4 (18) 1 (19)	Mean blood loss 117 ml, mean operative time 10 minutes, one suspected uterine perforation, no major complications.
Goldsmith, Kaltreider, and Margolis[33]	1977	Case series	N = 130 24 (14–15) 59 (16–17) 36 (18–19) 11 (20)	Complication rates with D&E similar to those found in JPSA/CDC. Slightly higher rates for infection and retained tissue than JPSA/CDC.

Table 10-3 *(continued)*
Studies of Dilatation and Evacuation Procedures, United States

Study	Date	Type Study	No. of Patients (Weeks' Gestation)	Findings
Goodman[35]	1977	Case series	N = 50 17 (14–15) 22 (16–17) 11 (18–19)	No major complications. One case of febrile morbidity.
Livingston[5]	1977	Case series	N = 6168 5896 (13–14) 272 (15–16)	Major complication rate of 0.58/100 D&E procedures. Total complication rate of 7.4/100 D&E.
Burnhill[36]	1978	Case series	N = 568 207 (15) 348 (16) 6 (17) 6 (18) 1 (19)	Total complication rate of 10.2/100 D&E procedures. Perforations 14 times more frequent with D&E after 14 menstrual weeks than before. Series based on underestimated gestations.
Kaltreider, Goldsmith and Margolis[16]	1979	Cohort, nonrandomized	N = 250 52 (14–15) 106 (16–17) 72 (18–19) 20 (≥ 20)	D&E was associated with greater comfort and less guilt, anger, and depression than $PGF_2\alpha$.
Grimes, Hulka, and McCutchen[22]	In press	Randomized clinical trial	N = 94 8 (< 12) 16 (13–14) 34 (15–16) 27 (17–18) 6 (19–20) 3 (≥ 21)	Total complication rate 6/100 D&E procedures; 34/100 $PGF_2\alpha$ procedures. Significantly better compliance with D&E regimen, shorter hospital stay, fewer gastrointestinal side effects.

patients whose fetuses are judged to be of a gestational age greater than 12 weeks.

Predilatation by laminaria appears to have considerable support in the current practice of second-trimester D&E. Acute mechanical dilatation of the cervix to large diameters can be technically difficult, traumatic, and potentially deleterious to a woman's subsequent childbearing capacity.[6,7] Most physicians who use laminaria leave them in place from 8 to 12 hours to as long as 24 hours. An occasional physician uses laminaria for less than 12 hours for pregnancies ≤ 16 weeks,[8] while others use repetitive packings of multiple laminaria over 48 hours.[9]

Although local and general anesthesia are used for second-trimester D&E abortions, the former is more popular. While the risks of major complications associated with local or general anesthesia for first-trimester suction curettage are comparable,[10] several studies have documented significantly greater blood loss with general anesthesia.[11] This observation may be applicable to second-trimester D&E as well. Halothane and other agents which relax the uterus should be avoided.[12]

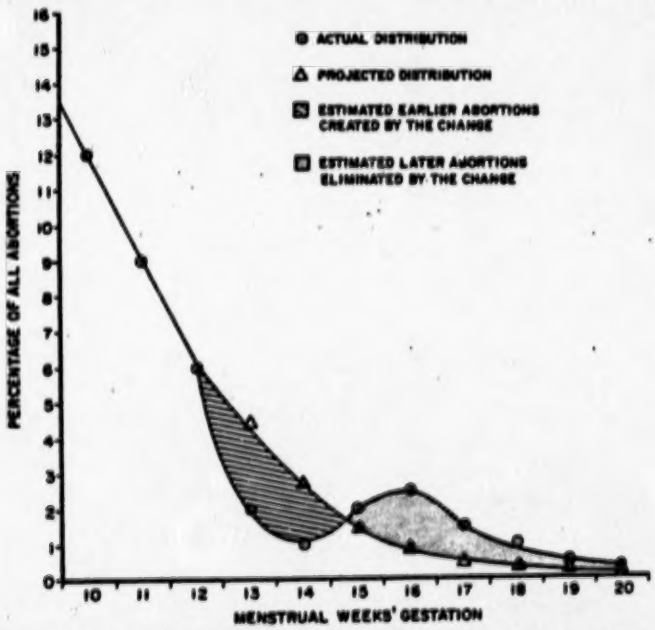


Figure 10-1 Actual distribution of abortions and projected distribution without any delay in the 13- to 16-week interval, by gestational age, US, 1975.

In addition to the smaller blood loss associated with local anesthesia, *intracervical* injection with anesthetics to which vasoconstrictors have been added may result in even less bleeding. As described by Finks, this procedure entails injecting a local anesthetic such as lidocaine with epinephrine deeply into the cervix and lower uterine segment.[13] Uptake of the solution in the uterus may be responsible for the effective hemostasis which is achieved in most cases. Extensive experience in the United States[14] as well as overseas[15,16] attests to the usefulness of this technique.

Most surgeons rely on large forceps to evacuate the products of conception. The commercially available Bierer, Sopher, Clemeston, or Peterson forceps feature heavy construction, long shanks, and reverse serrations on the grasping surfaces to provide a more secure grip. Large bore suction cannulae present an alternative to such forceps. Stubblefield and associates found that a 15.9 mm diameter suction cannula obviated the need for crushing forceps in the 15- to 16-week interval and earlier.[12] They also observed that the elimination of fetal dismemberment makes second-trimester D&E more acceptable to physicians. For later pregnancies, forceps were required, however.

Administration of oxytocic agents and prophylactic antibiotics varies from institution to institution. Many physicians give oxytocics to decrease intraoperative bleeding and to provide a firmer uterine wall. Others avoid them in hopes of avoiding entrapment of the fetal calvarium. Prophylactic antibiotics, usually tetracycline or doxycycline, commonly are given postoperatively.

Morbidity and Mortality

Dilatation and evacuation appears to be the safest available method of abortion through 20 weeks' gestation. As summarized in Table 10-3, numerous case series have documented major complication rates ranging from 0.4 to 1.7 per 100 abortions. Total complication rates have varied from 2.8 to 10.2 per 100 abortions.

Comparative studies are more illuminating, however. For example, Kaltreider, Goldsmith, and Margolis focused on the psychologic morbidity of D&E compared to intraamniotic $PGF_2\alpha$.[18] They found that D&E was associated with greater patient comfort and less guilt, anger, and depression than instillation of $PGF_2\alpha$. They also noted that much of the emotional burden of the abortion was shifted from the woman to the physician in these cases.

The initial report of the Joint Program for the Study of Abortion demonstrated that the major complication rate for D&E at 13 to 14 weeks' gestation (0.8 per 100 abortions) was less than that for saline instillation at any gestational age (1.4 to 2.5 per 100 abortions).[17] In

addition, the total complication rate for D&E at ≥ 15 weeks' gestation (7.9 per 100 abortions) was less than that for saline instillation at any gestational age (21.0 to 29.5 per 100 abortions).

Brenner and Edelman observed that performing a D&E abortion in the 13- to 15-week interval may be preferable to delaying until the woman is at ≥ 16 weeks' gestation for saline instillation.[18] The total complication rate associated with D&E at 13 to 15 weeks' gestation was 12.5 per 100 abortions, while that observed with saline instillation at 16 to 18 weeks was 10.6. However, "the saline method appeared to be associated with higher rates of serious or potentially serious complications—infections, pulmonary complications and death."[18]

Examining Hawaiian data, Smith and associates reached similar conclusions.[19] In the 13- to 16-week interval, D&E and suction curettage (alone or with sharp curettage) had total complication rates of 12.3 and 13.9 per 100 abortions, respectively. In contrast, saline abortion in this interval had a complication rate of 33.5. Smith et al. concluded that instrumental evacuation was the method of choice in the 13- to 16-week interval; they further advised that waiting to perform amnioinfusion was not justifiable in an attempt to reduce medical risks.

The second phase of the Joint Program for the Study of Abortion, incorporating an even larger sample size, corroborated the earlier findings.[20] In a comparison of 6213 abortions by D&E and 8662 by saline instillation at 13 to 20 weeks' gestation, D&E was found to be significantly safer. Major complication rates associated with the two methods were 0.69 and 1.78 per 100 abortions, respectively. Total complication rates paralleled major complication rates, although the differences were even greater. Women receiving saline required treatments for their complications significantly more often.

Critics of such nonrandomized studies have challenged their findings and have called for a randomized clinical trial to resolve the question of safety.[21] In response, a study was conducted at the University of North Carolina of 100 patients estimated to be 13 to 18 weeks' pregnant.[22] Fifty were allocated randomly to abortion by outpatient D&E and 50 to instillation of $PGF_2\alpha$. There were no significant differences in the demographic characteristics of the patients in either subgroup.

Patients assigned to abortion by $PGF_2\alpha$ waited significantly longer to obtain an abortion. The total complication rate for D&E was 6 per 100 abortions, while that for $PGF_2\alpha$ was 34. No major complications occurred in the D&E group in contrast to three in the $PGF_2\alpha$-treated group.[22] In addition, all but two women assigned to D&E underwent abortion as outpatients, while all women receiving $PGF_2\alpha$ spent at least one night in the hospital.

The mortality statistics for second-trimester D&E confirm its safety relative to abortion by instillation of abortifacients (see Chapter 12). The risk of dying from a D&E abortion at ⩾ 13 weeks is greater than that from curettage abortion earlier in pregnancy; nevertheless, the risk of dying appears to be less than that from instillation of either saline or prostaglandin $F_2\alpha$. From 1972 to 1977, D&E had an overall death-to-case rate of 8.3 per 100,000 abortions, compared with 20.6 for instillation of prostaglandin $F_2\alpha$ (and other agents), and 15.5 for saline. Thus, in terms of both morbidity and mortality, D&E appears to be the safest available method of second-trimester abortion.

CLINICAL COMPARISON OF DILATATION AND EVACUATION WITH INSTILLATION ABORTION

The optimal method of second-trimester abortion should be simple, convenient, inexpensive, and safe. Although no current method for second-trimester abortion fulfills all of these criteria, D&E satisfies more of them than do present day alternatives.

Performing a second-trimester D&E is more complex technically than performing an amnioinfusion. However, this disadvantage is balanced by a significantly higher success rate than that generally obtained with instillation abortions,[20] and the dilemma of a live fetus is eliminated. Clearly, either failed abortion or delivery of a live fetus substantially complicates the abortion process for all concerned.

How technically difficult is a second-trimester D&E? The operation appears to be simpler than a vaginal hysterectomy, an operation all gynecologists have learned to perform. Nonetheless, appropriate training and equipment are prerequisites for safe performance of D&E abortions. Residents in obstetrics and gynecology at Harvard University, for example, learn to perform such procedures under faculty supervision.[13] It is questionable whether this educational activity is widespread.

From the physician's perspective, second-trimester D&E is not only more complex technically but emotionally as well. To perform an amnioinfusion and then to leave the woman in the care of nurses is simpler indeed than confronting the destruction of the fetus during a D&E abortion. Many activities in medicine are stressful to physicians. Overall concern should be focused primarily on the emotional burden of the woman requesting second-trimester abortion, and secondarily on that of the medical staff which cares for her. This statement notwithstanding, it is possible to design programs which attempt to address the concerns of the staff as well as of the patient.[16-23]

Second-trimester D&E is more convenient than abortion by instillation of abortifacients. The woman can be scheduled immediately

for surgery at a specific date and time rather than having to wait for a hospital bed to become available. Absences from work or school and arrangements for child care can be made with certainty. Delays are openly discouraged. Some clinics performing D&E abortions use a graduated fee scale which increases with advancing gestational age.[34] Women undergoing D&E as outpatients avoid the inconvenience of admission and discharge from a hospital as well.

The medical staff also may find D&E more convenient than instillation abortions. Physicians can schedule D&E procedures. In contrast, with instillation abortions, a physician must remain available to attend to problems during labor and to complete the abortion in a high percentage of cases.[20] Nursing care for a woman undergoing D&E abortion is abbreviated and more convenient as well.

A second-trimester D&E is less expensive than an instillation abortion. The principal reason is that D&E abortions usually are performed on an outpatient basis. Although this is not necessarily representative of fees throughout the United States in 1979, the Director of the National Abortion Federation reveals that instillation abortions may cost as much as $275 more than a second-trimester D&E abortion provided at the same facility.

Abortion by second-trimester D&E is generally faster than by instillation of abortifacients. Although intervals for cervical predilatation by laminaria vary, most authors report a surgical evacuation time of less than 20 minutes. Both with laminaria pretreatment[22] and without,[20] D&E has had a significantly shorter duration than instillation abortions. Repetitive packing of laminaria,[9] however, entails a longer interval for predilatation and, hence, a total time which may exceed the induction-to-abortion times obtained with current instillation regimens.

As noted previously, D&E appears to be the safest available method of second-trimester abortion. Case series, prospective single and multicenter cohort studies, a randomized clinical trial, and nationwide surveillance of abortion-related deaths, all support this conclusion. The potential late complications of second-trimester D&E, as well as of other second-trimester techniques, remain largely speculative. Clearly, additional study is needed in this area. Until such information is available, however, the choice of abortion methods should be based on currently known information rather than on speculation.

CONCLUSION

D&E is a leading method of second-trimester abortion in the United

States today in spite of allegations to the contrary.[11] The technique commonly consists of dilatation by laminaria followed by evacuation with special forceps, combined with sharp and suction curettage. More than 15 publications in the United States have documented low morbidity rates for the procedure, and nationwide surveillance of abortion deaths has demonstrated a low mortality rate as well.

Although D&E is technically and emotionally more complex for the physician, it is simpler, more convenient, less expensive, faster, and safer for the woman. It is emotionally less traumatic from the patient's point of view.[16] Existing data suggest that D&E should be considered against which all new methods of second-trimester abortion should be compared.

REFERENCES

1. Center for Disease Control: *Abortion Surveillance 1977*, Atlanta, issued September, 1979.
2. Grimes DA, Cates W Jr: Fatal amniotic fluid embolism during induced abortion, 1972–1975, *South Med J.* 70:1325, 1977.
3. Cates W Jr: D&E after 12 weeks: safe or hazardous? *Contemp Ob/Gyn.* 13:23, 1979.
4. Cates W Jr, Schulz KF, Grimes DA, et al: The effects of delay and method of choice on the risk of abortion morbidity. *Fam Plann Perspect.* 9:266, 1977.
5. Livingston FM: Affidavit to the Superior Court of the New Jersey Appellate Division, Bergen County, October 21, 1977.
6. Hulka J, Higgins G: Tears of the internal cervical os during dilatation for routine curettage. *Am J Obstet Gynecol.* 82:913, 1961.
7. Harlap S, Shino P, Ramcharan S, et al: A prospective study of spontaneous fetal losses after induced abortions: *N Engl J Med.* 301:677, 1979.
8. Hanson MS: D&E midtrimester abortion. Presented at the 16th annual meeting, Association of Planned Parenthood Physicians, San Diego, October 25–27, 1977.
9. Hern WM, Oakes AG: Multiple laminaria treatment in early midtrimester outpatient suction abortion: a preliminary report. *Adv Plann Parent.* 12:93, 1977.
10. Grimes DA, Schulz KF, Cates W Jr, et al: Local versus general anesthesia: which is safer for performing suction curettage abortions? *Am J Obstet Gynecol.* (in press).
11. Grimes DA, Cates W Jr: Complications from legally-induced abortion: a review. *Obstet Gynecol Surv.* 34:177, 1979.
12. Stubblefield PG, Albrecht BH, Koos E, et al: A randomized study of 12 mm and 15.9 mm cannulas in midtrimester abortion by laminaria and vacuum curettage. *Fertil Steril.* 29:512, 1978.
13. Finks AA: Midtrimester abortion. *Lancet* 1:263, 1973.
14. Barr MM: Midtrimester abortions—12 to 20 weeks by dilatation and evacuation method under local anesthesia. *Adv Plann Parent.* 13:16, 1978.
15. Van Den Bergh AS: Abortion procured in the second trimester of pregnancy. *Medisch Contact* 29:1555, 1974.

16. Kaltreider NB, Goldsmith S, Margolis AJ: The impact of midtrimester abortion techniques on patients and staff. *Am J Obstet Gynecol.* 135:235, 1979.

17. Tietze C, Lewit S: Early medical complications of abortion by saline: Joint Program for the Study of Abortion (JPSA). *Stud Fam Plann.* 4:133, 1973.

18. Brenner WE, Edelman DA: Dilatation and evacuation of 13 to 15 weeks' gestation versus intraamniotic saline after 15 weeks' gestation. *Contraception* 10:171, 1974.

19. Smith RG, Steinhoff PG, Palmore JA: Potential reduction of medical complications from induced abortions. *Int J Obstet Gynecol.* 15:337, 1978.

20. Grimes DA, Schulz KF, Cates W Jr, et al: Midtrimester abortion by dilatation and evacuation. A safe and practical alternative. *N Engl J Med.* 296:1141, 1977.

21. Borell U, Embrey MP, Bygdeman M, et al: Midtrimester abortion by dilatation and evacuation. (Letter). *Am J Obstet Gynecol.* 131:232, 1978.

22. Grimes DA, Hulka JF, McCutchen MF: Midtrimester abortion by dilatation and evacuation versus intraamniotic instillation of prostaglandin $F_{2\alpha}$: a randomized clinical trial. *Am J Obstet Gynecol.* 137:785, 1980.

23. Rooks JB, Cates W Jr: Emotional impact of D&E versus instillation. *Fam Plann Perspect.* 9:276, 1977.

24. *1979 Membership Directory,* New York, National Abortion Federation, 1979.

25. Burnhill MS: Vaginal second trimester abortion, in Sciarra JJ, Speidel JJ, Zatuchni G (eds): *Risks, Benefits, and Controversies in Fertility Control.* Hagerstown, Md., Harper & Row, 1978, p 331.

26. DeLee ST: Termination of pregnancy in the midtrimester using a new technique: preliminary report. *Int Surg.* 61:545, 1976.

27. Glick E, Sacks M: Public health aspects of dilatation and evacuation. Presented at the 106th annual meeting of the American Public Health Association, Los Angeles, October 14, 1978.

28. Goodman MP: Vacuum dilatation and evacuation for midtrimester abortion. *J Reprod Med.* (in press).

29. Hodari AA, Peralta J, Quiroga PJ, et al: Dilatation and curettage for second-trimester abortions. *Am J Obstet Gynecol.* 127:850, 1977.

30. Koplik L: Early midtrimester abortion by curettage. Presented at the 13th annual meeting, Association of Planned Parenthood Physicians, Los Angeles, April 7, 1975.

31. Meadowbrook Women's Clinic: D&E procedures. *Meadowbrook Memo* 3:1, 1978.

32. Berry FN, Peterson WF: D&E plus suction in midtrimester abortion. *The Female Patient* 3:86, November 1978.

33. Tietze C, Lewit S: Joint Program for the Study of Abortion: early medical complications of legal abortion. *Stud Fam Plann.* 3:97, 1972.

34. Stewart GK, Goldstein P: Medical and surgical complications of therapeutic abortions. *Obstet Gynecol.* 40:539, 1972.

35. Goldsmith S, Kaltreider NB, Margolis AJ: Second trimester abortion by dilatation and evacuation (D&E); surgical techniques and psychological reactions. Presented at the 15th annual meeting, Association of Planned Parenthood Physicians, Atlanta, October 13, 1977.

Document #10

Abortion Facilities and the Risk of Death

By David A. Grimes, Willard Cates, Jr., and Richard M. Selik

Summary

While the number of abortions performed annually in the United States has increased steadily since 1969, the proportion of abortions performed in hospitals has been declining since 1975. Between 1974 and 1977, 1,229,000 abortions were performed at 12 or fewer weeks' gestation in U.S. hospitals, while 2,730,000 were performed in freestanding clinics and doctors' offices. Over the same period, there were 19 deaths which resulted from in-hospital procedures, and 17 from abortions performed in nonhospital facilities. The crude death-to-case rates are 1.5 deaths per 100,000 procedures for hospital abortions, and 0.6 deaths per 100,000 abortions performed in nonhospital facilities. When these rates are adjusted for the presence of preexisting medical conditions and for the concurrent performance of sterilizations, the death-to-case rates for first-trimester abortions performed in both kinds of facilities were about 0.7.

Survey Methodology

Abortion-related deaths were identified through the ongoing surveillance of abortion mortality by the Centers for Disease Control (CDC); the methods have been described previously.[1] We categorized by type of facility (hospital versus freestanding clinic or physician's office) all deaths associated with legal abortion at 12 or fewer weeks' gestation that occurred in the United States between January 1, 1974, and December 31, 1977. Since data supplied to the CDC do not include numbers of abortions by type of abortion facility, we obtained this information from the annual surveys of abortion providers conducted by The Alan Guttmacher Institute (AGI).[2] In these surveys, nonhospital facilities included freestanding abortion clinics, generally with large caseloads, and physicians who perform abortions in their offices. Abortions performed in hospitals or hospital clinics on an outpatient basis were categorized in the AGI surveys as hospital abortions.

For each kind of facility, we calculated death-to-case rates by dividing the number of deaths by the number of abortions performed between 1974 and 1977. The AGI surveys for 1976 and 1977 reported the number of abortions at 12 or fewer weeks' gestation performed in each type of facility.[3] To derive comparable denominators for the data from the 1974 and 1975 surveys, which did not report this breakdown, we assumed that all abortions at 13 or more weeks' gestation in 1974 and 1975 took place in hospitals. We then subtracted the estimated number of abortions at 13 or more weeks' gestation[4] from the AGI hospital abortion totals for 1974–1975. This provided an estimate of the number of abortions performed at 12 or fewer weeks' gestation in hospitals. We also assumed that all abortions in nonhospital facilities were at 12 or fewer weeks' gestation. We used the total number of abortions reported to the AGI for nonhospital facilities as the denominator for that category.

Results

Thirty-six women died as a result of legal abortions performed at 12 or fewer weeks' gestation in the United States during 1974–1977; 19 of the abortions were performed in hospitals, and 17, in nonhospital facilities. Characteristics of women in both groups were similar. The mean age of women who died after hospital abortions was 26.3 years; after nonhospital abortions, 23.5 years. Of the hospital group, 58 percent were white; of the nonhospital group, 53 percent. Mean gravidity for the hospital group was 2.8 pregnancies per woman, compared with 3.1 for the nonhospital group. Excluding the one nonhospital patient who was not pregnant at abortion, the mean gestational age of the hospital group was 9.8 weeks, compared with 9.2 weeks for the nonhospital group. None of these differences were statistically significant.

Eight women in the hospital group had preexisting medical problems, compared to only two in the nonhospital group. Seven in the hospital group underwent concurrent sterilization, while none in the nonhospital group did.

Table 1 shows the causes of death of all the 36 women. Adverse reactions to anesthesia or analgesia and embolic events were the commonest causes. No cause of death was represented disproportionately among the women in either group.

As Table 2 (page 32) shows, the 36 women who died were among 3,959,000* who underwent abortion at 12 or fewer weeks' gestation in the study period, for an overall death-to-case rate of 0.9 per 100,000 abortions. The crude death-to-case rate was 1.5 per 100,000 abortions for the hospital group and 0.6 for the nonhospital group.

Women who obtain abortions in hospitals and in nonhospital facilities are probably not comparable. Those receiving care in hospitals constitute a high-risk group because women who are ill or request concurrent sterilization are overrepresented among them. Accordingly, we have attempted to control for the distorting effects of preexist-

David A. Grimes is Assistant Chief and Willard Cates, Jr., is Chief of the Abortion Surveillance Branch, Family Planning Evaluation Division, at the Centers for Disease Control DHHS, Atlanta, Georgia. Richard M. Selik was an Epidemic Intelligence Service Officer in the Abortion Surveillance Branch. He is currently a Medical Epidemiologist with the Community Health Services Division of the New Jersey State Department of Health.

*This figure, which is also given in Table 2, differs slightly from the total number of first-trimester abortions reported in the AGI annual surveys for 1974–1977 (see reference 3). The discrepancy occurs because the numbers of first-trimester abortions performed in hospitals and in clinics were not directly available from the 1974 and 1975 AGI surveys. For those two years, the figures were estimated, using CDC data for the proportion of all abortions which took place in the first trimester (see reference 4). This proportion was applied to the AGI total of hospital abortions to yield the number taking place in the first trimester. It was assumed that all nonhospital abortions took place in the first trimester. Although the total differs slightly from that reported to AGI, the difference is small, and does not affect the death-to-case rates reported here.

ing health problems and concurrent sterilization on the risk of death among the hospital group. Based on the distribution in the Joint Program for the Study of Abortion (conducted under the auspices of the CDC), we assumed that 15.9 percent of women undergoing abortion at 12 or fewer weeks' gestation had one or more preexisting medical problems.[5] We subtracted this proportion of women from the denominator and the eight cases with preexisting problems from the numerator. This adjustment lowered the death-to-case rate for the hospital group to 1.1 deaths per 100,000 abortions.

Similarly, we assumed that 2.2 percent of women undergoing abortion at 12 or fewer weeks' gestation underwent concurrent sterilizations.[6] We subtracted this proportion of cases from the denominator of the hospital group and the seven cases involving sterilization from the numerator. This resulted in a death-to-case rate among the hospital group of 1.0 deaths per 100,000 abortions. Finally, we accounted for both factors simultaneously. We assumed that a maximum of 18.1 percent of women had a preexisting condition, underwent concurrent sterilization, or both, and we deleted this fraction from the hospital denominator. Similarly, we subtracted 12 cases involving either preexisting conditions or concurrent sterilization from the numerator. As the table shows, the resulting adjusted death-to-case rate for the hospital group is 0.7 deaths per 100,000 abortions, similar to the crude rate for the nonhospital group, 0.6 per 100,000.

Direct information about the number of deaths and number of abortions was available for 1976–1977 (although not for the earlier period). Among the 643,000 women who obtained hospital abortions in 1976–1977, six died, for a crude death-to-case rate of 0.9 deaths per 100,000 procedures. Similarly, five women out of 1,624,000 died after nonhospital abortions, for a crude death-to-case rate of 0.3. These rates derived from direct enumeration are consistent with our rates based upon the estimated denominators.

Discussion

This analysis suggests that the crude death-to-case rate is higher for abortions performed at 12 or fewer weeks' gestation in hospitals than it is for comparable abortions performed outside of hospitals. As shown in our previous study; however, adjusting for preexisting conditions and concurrent sterilization in the hospital group virtually eliminates the differences.[7] For several reasons, these death-to-case rates should be interpreted cautiously. First, the number of deaths in each group is small. In such a situation, small changes in the number of deaths produce large fluctuations in death-to-case rates. Underreporting of deaths may also bias these rates. However, the CDC's active surveillance system identifies 50 percent more abortion-related deaths than are detected through traditional vital statistics channels, and systematic underreporting of deaths following abortion in either type of facility is unlikely.[8]

A second important limitation of these rates concerns the fact that their denominators are estimates. Data on the number of abortions at 12 or fewer weeks' gestation by type of facility were only available for 1976 and 1977; the numbers for 1974–1975 were estimated. To the extent that abortions at 13 or more weeks' gestation were performed in nonhospital facilities in 1974–1975, our estimated number of abortions at 12 or fewer weeks' gestation in hospitals is too low, and the death-to-case rate, therefore, too high. Similarly, to the extent that abortions at 13 or more weeks' gestation were performed in nonhospital facilities in 1974–1975, the estimated number of abortions at 12 or fewer weeks' gestation in nonhospital facilities is too high and the death-to-case rate too low. Thus, if our initial assumptions about the gestational-age distributions for abortions in each type of facility in 1974–1975 were inaccurate, they would tend to make hospital abortions appear less safe.

Data from 1976 and 1977 suggest that in 1974–1975, abortions at 13 or more weeks' gestation were *not*, in fact, limited to hospi-

Table 1. Weeks since last menstrual period (LMP), preexisting health conditions, performance of concurrent sterilization and causes of death for women who died following legal abortion at 12 or fewer weeks' gestation, by type of facility, United States, 1974–1977

Weeks since LMP	Preexisting conditions	Concurrent sterilization	Cause of death
Hospital			
6	None	No	Reaction to anesthesia
8	None	Laparoscopy	Cerebral hypoxia
8	Hodgkin's disease	No	Pulmonary embolus
8	None	Laparotomy	Pulmonary embolus
8	None	No	Suspected pulmonary embolus
9	None	No	Reaction to anesthesia
9	Rheumatoid arthritis	No	Myocarditis
10	None	Laparotomy	Pulmonary embolus
10	None	No	Myocarditis
10	None	No	Reaction to anesthesia
10	Heart disease	Hysterectomy	Heart disease
10	None	Laparotomy	Reaction to anesthesia
11	None	No	Hemorrhage
11	Heart disease	Laparotomy	Suspected cerebral embolus
11	Obesity, hypertension	Laparotomy	Reaction to anesthesia
12	Heart disease	No	Heart disease
12	None	No	Sepsis
12	Thrombophlebitis	No	Pulmonary embolus
12	Obesity	No	Hemorrhage
Nonhospital			
Not pregnant	None	No	Reaction to anesthesia
4	None	No	Reaction to anesthesia
5	None	No	Sepsis
6	None	No	Cerebrovascular accident
8	None	No	Reaction to anesthesia
9	None	No	Peritonitis
9	None	No	Pulmonary embolus
9	None	No	Hemorrhage
9	None	No	Hemorrhage
10	None	No	Reaction to anesthesia
10	None	No	Air embolus
10	Coronary artery disease	No	Suspected myocardial infarction
11	None	No	Pulmonary embolus
11	None	No	Sepsis
12	Drug addiction	No	Reaction to analgesia
12	None	No	Reaction to anesthesia
12	None	No	Hemorrhage

Table 2. Number of deaths, number of abortions and death-to-case rates for abortions at 12 or fewer weeks' gestation by type of facility, including and excluding women with preexisting medical conditions and concurrent sterilizations, United States, 1974–1977

Type of facility	No. of deaths	No. of abortions	Death-to-case rate*
Including women with medical conditions or sterilization			
Total	36	3,959,000	0.9
Hospital	19	1,229,000	1.5
Nonhospital	17	2,730,000	0.6
Excluding women with medical conditions or sterilization			
Total	24	3,737,000	0.6
Hospital	7	1,007,000	0.7
Nonhospital	15	2,296,000	0.7

*Deaths per 100,000 abortions.

tals. In 1976, 24 percent of all abortions at 13 or more weeks' gestation were performed in nonhospital facilities, and this percentage increased to 33 percent in 1977.[9] To measure the potential influence of our assumptions about denominators on the results, we applied the 1976 distribution of abortions at 13 or more weeks' gestation to the 1974–1975 totals for each type of facility. Using these revised denominators for 1974–1975, we recalculated the death-to-case rates for 1974–1977. The crude rates for hospitals and nonhospital facilities were unchanged. Adjusted for preexisting conditions, the death-to-case rate for the hospital group fell to 1.0 deaths per 100,000 abortions; adjusted for sterilization, it was also 1.0; adjusted for both factors simultaneously, it was 0.7. Thus, any imprecision in our denominator estimates had a negligible impact on the results.

While concurrent sterilization is usually limited to women having an abortion in a hospital, preexisting medical problems are found among patients in both groups. To assess the risk of death in nonhospital facilities for women without preexisting problems, we adjusted the nonhospital death-to-case rate, again assuming a 15.9 percent prevalence of preexisting conditions. Subtracting two deaths from the numerator and about 400,000 abortions from the denominator increased the death-to-case rate from 0.6 to 0.7 deaths per 100,000 for nonhospital abortions as Table 2 shows. This rate is equivalent to the adjusted rate for the hospital group.

Although perforation of the uterus probably lingers as the most feared complication of abortion at 12 or fewer weeks' gestation, anesthesia and analgesia accidents have, in fact, claimed more lives. In the period 1974–1977, complications of anesthesia or analgesia were the most frequent cause of death, concurrently are likely to receive these services in hospitals, women coming to accounting for nearly one-third of all deaths, as Table 1 shows. Deficiencies in technique, equipment or personnel were not unique to either hospital or nonhospital facilities. Whenever drugs are administered for sedation or pain relief, comprehensive resuscitation equipment as well as staff experienced in its use must be available immediately.[10]

References

1. Center for Disease Control, DHEW (CDC), *Abortion Surveillance, Annual Summary, 1977*, Atlanta, 1979.

2. J. D. Forrest, E. Sullivan and C. Tietze, "Abortion in the United States, 1977–1978," *Family Planning Perspectives*, 11:329, 1979; J. D. Forrest, C. Tietze and E. Sullivan, "Abortion in the United States, 1976–1977," *Family Planning Perspectives*, 10:271, 1978; E. Sullivan, C. Tietze and J. G. Dryfoos, "Legal Abortion in the United States, 1975–1976," *Family Planning Perspectives*, 9:116, 1977; and E. Weinstock, C. Tietze, F. S. Jaffe and J. G. Dryfoos, "Abortion Need and Services in the United States, 1974–1975," *Family Planning Perspectives*, 8:58, 1976.

3. J. D. Forrest, E. Sullivan, C. Tietze, 1979, op. cit.

4. CDC, *Abortion Surveillance Annual Summary, 1974*; and . . . 1973, Atlanta, 1976 and 1977.

5. Joint Program for the Study of Abortion, unpublished data.

6. Ibid.

7. D. A. Grimes, W. Cates, Jr. and C. W. Tyler, Jr., "Comparative Risk of Death from Legally Induced Abortion in Hospitals and Nonhospital Facilities," *Obstetrics and Gynecology*, 51:323, 1978.

8. W. Cates, Jr., J. C. Smith, R. W. Rochat, J. E. Patterson and A. Dolman, "Assessment of Surveillance and Vital Statistics Data for Monitoring Abortion Mortality, United States, 1972–1975," *American Journal of Epidemiology*, 108:200, 1978.

9. J. D. Forrest, E. Sullivan, and C. Tietze, 1979, op. cit.

10. D. A. Grimes and W. Cates, Jr., "Deaths from Paracervical Anesthesia Used for First-Trimester Abortion, 1972–1975," *New England Journal of Medicine*, 295:1397, 1976.

Document #11

A
Population
Council
Fact Book

Induced Abortion

A World Review, 1981

Christopher Tietze

4th edition

A Population Council Fact Book
The Population Council, New York

Complications and Sequelae

Induced abortion, at any period of gestation, exposes a woman to a risk of complications that is always larger than zero but that can vary considerably, depending on the circumstances under which the abortion is performed. The severity of complications also varies widely from very minor complaints to the occasional fatal outcome. Complications can be divided into two categories—early, that is, within around one month after the abortion, and late, those occurring more than one month after the procedure. Early complications may be further subdivided into immediate, defined as those occurring (although not necessarily discovered) during the procedure or within a few hours after its completion, and delayed complications, those developing later but still within one month.

Serious immediate complications are rare with abortions performed in medical settings. They include perforation of the uterus by one of the instruments used for instrumental evacuation, sometimes combined with injury to the intestines or other organs; major hemorrhage; laceration of the cervix; severe disturbances of blood coagulation and hypernatremia associated with saline-induced abortions; water intoxication resulting from the use of high doses of oxytocin; and untoward effects of general or local anesthesia.

The most frequent delayed complications include retention of fragments of the placenta resulting in postabortal bleeding; infection, which may range from mild endometritis through more severe forms of pelvic inflammatory disease to generalized peritonitis and septicemia; and venous thrombophlebitis resulting in pulmonary embolism. Postabortal depression has been reported but is rare, and guilt feelings are usually of short duration (*Brewer, 1977; David, 1978b*). The psychological reaction most commonly noted is relief.

Known late somatic complications or sequelae of induced abortions in medical settings are sensitization of Rh-negative women by red blood cells from an Rh-positive fetus, preventable by injection of Rh-immune globulin, and endometriosis in scar tissue after hysterotomy. Over the past decade, several investigators have addressed themselves to the question of possible adverse outcome of pregnancies following induced abortion, primarily low birth weight, short gestation, and second trimester spontaneous abortion. Major problems encountered in these studies include the following:

1 Many women are reluctant to reveal prior induced abortions, even those obtained in legal settings. Because they may be more willing to do so if the outcome of a subsequent pregnancy has been unfavorable (*Hogue, 1975*) or such an event is threatened, it is important that the prior abortion experience be ascertained before an adverse outcome of the subsequent pregnancy is known or suspected.
2 Low birth weight, short gestation, and spontaneous abortion are associated with a variety of background factors, including the woman's age, parity, ethnicity, socioeconomic status, and smoking habits, that may be independently associated with the incidence of induced abortion. Some investigators have not taken these factors into consideration, while attempts at more complete analysis have been constrained by loss of statistical significance.

Because risks to the outcome of subsequent pregnancies are of greatest interest to women who terminate their first pregnancy or pregnancies by induced abortion but may want children later, Table 19 presents a synopsis of nine major studies of the outcome of the first pregnancy following one or more abortions performed in medical settings. These studies were conducted in 16 locations and involved a total of about 12,000 women with abortion experience and 90,000 women in comparison groups.[1] The number of study groups (SGs), defined in terms of location, adverse outcome, and method of abortion, is 29, including two with information on women who had two or more abortions prior to the pregnancy under consideration.

1 When women with one abortion and no other prior pregnancies are compared with women pregnant for the first time (gravida 1), they have a relative risk of adverse outcome greater than unity in only 12 of the 29 SGs.
2 The relative risk is significantly increased (at the 0.05 level) in only two SGs. However, of the 27 SGs with statistically nonsignificant findings, only 13 are large enough to offer at least an 80 percent chance of detecting a risk of adverse outcome twice as large as in the comparison group.
3 The average relative risk (unweighted) is 1.08 for low birth weight, 1.05 for short gestation, and 1.45 for midtrimester spontaneous abortion. The average risk attributable to the abortion is quite small: 0.9 per 100 infants for low birth weight, virtually zero for short gestation, and 1.0 per 100 pregnancies for midtrimester spontaneous abortion.

[1] Excluding the earliest and largest of the nine studies (*Hungary, 1980*), there were 6,000 women with abortion experience and almost 33,000 women in comparison groups.

4 The two SGs with significantly increased risks of adverse outcomes involved surgical curettage in Hungary and Poland. It is not clear, however, whether the primary cause of the higher risk is the method of abortion or some other biological or social factor associated with geography. No consistent pattern was found in the locations where both methods were used.

5 When women with one prior abortion are compared with women pregnant for the second time following a live birth (gravida 2), the risks are almost always higher than when they are compared with primigravidae. A relative risk significantly greater than unity appears in 6 out of the 25 SGs for which this comparison is possible. This finding reflects the well-established higher risks normally associated with the first pregnancy. It can be argued that the induced abortion has merely shifted these higher risks from the first to the second pregnancy.

6 As one would expect, women who have had two or more induced abortions and no other prior pregnancy are subject to higher risks of adverse outcome in the first subsequent pregnancy than those who have had only one prior abortion. There is no indication, however, that the risks increase more than is explained by the multiple abortion experience. A sharply increased risk of spontaneous abortion after multiple induced abortions was also found in a study not included in Table 19 because it is not limited to first subsequent pregnancies (*Levin, 1980*).

Secondary sterility and ectopic pregnancy can be the late results of pelvic infection following self-induced abortions or abortions performed in nonmedical settings. The role of legal abortion in the etiology of these conditions and of placenta previa and dysmenorrhea has not been established. Sterility can also result from hysterectomy, performed because of major hemorrhage in the course of another abortion procedure, but this is a rare occurrence in medical settings. In the Joint Program for the Study of Abortion (*Tietze, 1972*), 39 secondary hysterectomies were identified among 73,000 legal abortions in 1970/71, or one in 1,900 procedures. The incidence of these tragic events has doubtless declined with increasing experience. In Canada, only 24 secondary hysterectomies were reported among 238,000 abortions in 1974–79, or one in 10,000 cases (*Canada, 1980*).

Adverse psychological sequelae of induced abortion have been a matter of concern. Some authors, including some psychiatrists, have expressed the view that every abortion is a stressful experience involving major risks to mental health. Others have pointed out that most women undergoing abortion continue to lead essentially normal lives and that an adverse psychological reaction to an unwanted birth may be far more common and more serious than an adverse reaction to having an abortion. The WHO Scientific Group on Spontaneous and Induced Abortion concluded early on that "there is no doubt that the termination of pregnancy may precipitate a serious psychoneurotic or even psychotic reaction in a susceptible individual" (*WHO, 1970*, p. 41), but pointed out that emotional stress experienced by the woman may be more closely associated with such factors as the circumstances under which the abortion was performed (legal or clandestine), the period of gestation, the type of operation, and the attitudes of the woman's family and of the professionals and other persons involved in the abortion. This conclusion was reinforced by another Scientific Group, convened eight years later, which stated that "there is now a substantial body of data, reported from many countries after careful and objective follow-up, suggesting frequent psychological benefit and a low incidence of adverse psychological sequelae" (*WHO, 1978*, p. 22). With increasing acceptance of abortion by the medical profession and by the general public, concern about its long-term effects on mental health appears to be diminishing.

A quantitative comparison of morbidity resulting in different countries from, or associated with, legal abortion cannot be made at this time. Although the International Classification of Diseases adequately identifies many types of complications associated with termination of pregnancy, no standards exist for evaluating and recording the severity of these complications. It is, therefore, not surprising that the statistics on the early complications of legal abortions, published by national health authorities, are not comparable.

In 1978, complication rates officially reported from five countries ranged from 0.2 percent to 4.7 percent:

Country	Percent	
Czechoslovakia	0.2	
England and Wales	1.1	
1st trimester		0.7
2nd trimester		3.2
German Fed. Rep. (1979)	2.0	
1st trimester		1.7
2nd trimester		3.7
Canada	2.7	
1st trimester		1.0
2nd trimester		12.0
Denmark	4.7	
1st trimester		4.6
2nd trimester		12.3

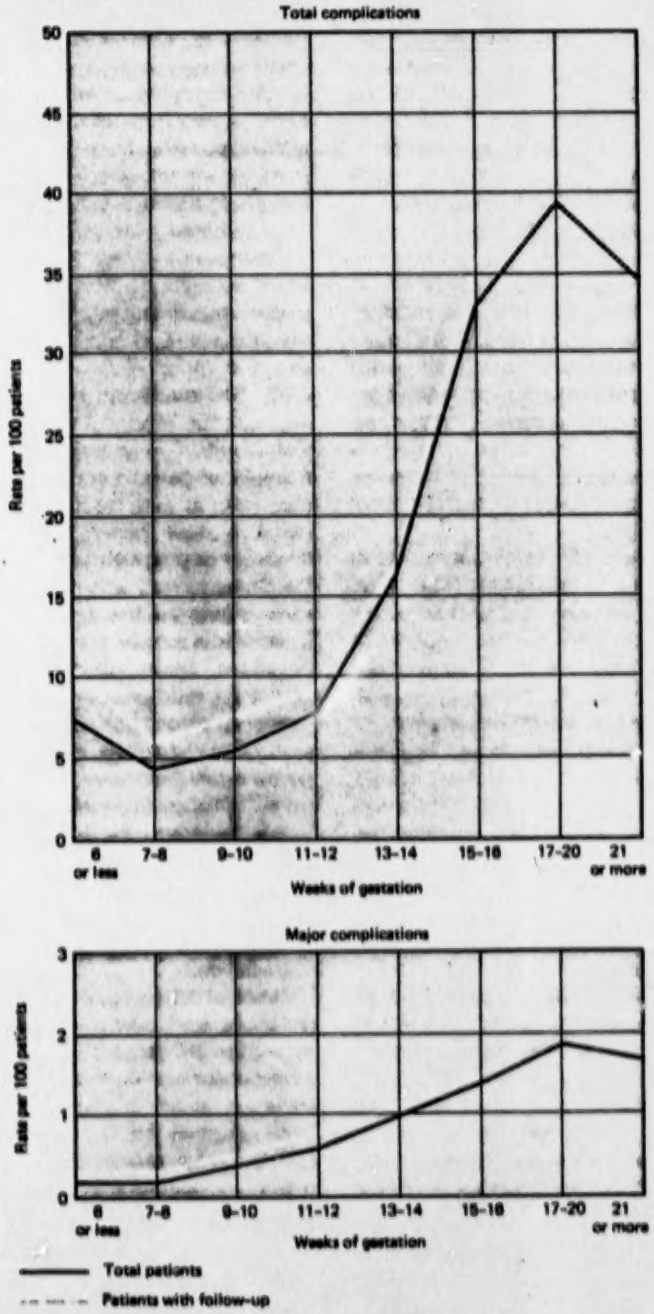
The rates for England and Wales are based on the number of complications reported, those for the

other four countries on the number of women with one or more complications.

The most comprehensive large-scale investigations of early medical complications of legal abortions were undertaken in the United States by the Joint Program for the Study of Abortion (JPSA), sponsored by the Population Council during 1970/71 (*Tietze, 1972, 1973b*) and continued by the Centers for Disease Control (CDC) as JPSA/CDC from 1971 to 1975. These two large-scale studies permit assessment of the interaction of variables that determine levels of morbidity, such as age and parity, socioeconomic and health status, period of gestation, operative procedure, concurrent sterilization, and other factors.

Rates of "total" and "major" complications obtained by JPSA/CDC are shown in Table 20 and Figure 12. The rates of total complications are very high because the case records submitted by the participating institutions included many minor complaints, such as a single day of fever or vomiting after anesthesia, that are not usually listed in official reports. A broad definition of complications has the advantage of including complaints reported by patients as well as diagnoses by physicians and of permitting the analysis of incidence for comparatively small numbers of women. However, it may produce a distorted impression of the risk to health associated with legal abortion. A more restricted group of major complications was, therefore, identified in the JPSA/CDC, including the following: cardiac arrest; convulsions; endotoxic shock; fever for three or more days; hemorrhage necessitating blood transfusion; hypernatremia; injury to bladder, ureter, or intestines; pelvic infection with two or more days of fever and a peak of at least 40° C or with

FIGURE 12 Range of complication rates per 100 abortion patients without preexisting complications or concurrent sterilization, by weeks of gestation: United States, 1971–75 (JPSA/CDC)



hospitalization for 11 or more days; pulmonary embolism or infarction; thrombophlebitis; unintended major surgery; wound disruption after hysterotomy or hysterectomy; and of course death from any cause. (An almost identical classification was used in the original JPSA.) The total number of cases in the JPSA/CDC with one or more major complications was 6.5 percent of all patients with any complications.

Although every definition of a major complication is arbitrary to some degree, the proportion of such complications, as defined above, among each type of complication corresponded to the judgment of experienced clinicians. Furthermore, the patterns of major and total complications were similar in their association with such variables as period of gestation and operative procedure.

In analyzing the complications of abortion, a distinction should be drawn between complications associated with the termination of pregnancy and those associated with preexisting pathology or with surgical procedures undertaken for other purposes, such as the achievement of permanent sterility or the removal of the uterus because of fibroid tumors. For this reason, complication rates are shown not only for the aggregate of all patients but also for presumably healthy women subject to only the risks associated with the abortion procedure, that is, excluding all women with reported preexisting complications and those undergoing sterilizing operations.

Complication rates are also shown for total patients and for patients with follow-up. Follow-up was defined as any contact with the woman 14 or more days after the abortion, including contact by mail or by telephone either directly by the investigator or by the physician who referred her to the hospital or clinic or by the physician to whom she was referred for aftercare. The complication rate for total patients represents a minimum estimate of postabortal complications in the participating institutions. Since patients with complications are more likely to return for care than those without complications, the rate for patients with follow-up represents a maximum estimate of the incidence of postabortal complications.

As shown in Table 20, the minimum estimate of the total complication rate, including all reported diagnoses and complaints, was 12.3 per 100 for all women in JPSA/CDC. The maximum estimate was 14.9 per 100 women with follow-up. Complication rates were higher at 6 weeks of gestation or earlier than they were at 7–10 weeks, but complication rates during the second trimester of pregnancy were four to five times as high as corresponding rates during the first trimester. The pattern was similar for major complications, which are more significant than total complications. The incidence of total and of major complications increased by about 20 percent with *each week* of gestation from 7 through 20 weeks.

For total and major complications, the rates observed in the group of presumably healthy women, exposed to the risk of abortion only, were lower at each period of gestation.

Rates of total and of major complications were lowest for abortions by suction curettage at 12 weeks of gestation or earlier, followed in ascending order by instrumental evacuation at 13 weeks or later (D & E), intra-amniotic instillation of hypertonic saline solution, instillation of prostaglandin, hysterotomy, and hysterectomy.

The high rates of total complications for saline and prostaglandin instillation reflect a high incidence of retention of the placenta, requiring manual or instrumental removal, and, in the case of PG, of gastrointestinal symptoms, such as vomiting and diarrhea. Total and major complication rates for the two major surgical procedures are virtually identical. Complication rates for hysterotomy include abortions with concurrent sterilization because the two procedures are usually combined.

The differences in major complication rates between instrumental evacuation (D & E) and saline, as well as those between saline and PG, remain statistically significant (with p-values of less than .001 and .01, respectively) after standardization for woman's age, preexisting medical conditions, weeks of gestation, level of operator training, prophylactic use of antibiotics, and follow-up (*Grimes, 1977a, b, c*). The relative position of D & E vis-à-vis saline has also been confirmed by national mortality statistics in the United States and Britain and, most recently, by a controlled study (*Grimes, 1980*). These findings have important clinical and public health implications (*Cates, 1980a; Grimes, 1978*).

For women without preexisting complications who had abortions by suction, the risk of postabortal complications was considerably increased when abortion was combined with tubal sterilization via laparotomy, much less so when the tubes were approached by the laparoscopic route. The laparotomies were of the traditional type, with a comparatively large incision; minilaparotomy was not used in the participating institutions. Complication rates were virtually the same for women who had abortions under local and general anesthesia.

The following additional findings appear to be firmly supported by a

number of reports, including several controlled studies with random allocation of patients to different procedures and/or regimens, with excellent follow-up.

1 The incidence of early complications is lower with suction curettage than with surgical curettage (*Andolšek, 1974; Hungary, 1978*).

2 Loss of blood during suction curettage tends to be greater if the procedure is carried out under general anesthesia than if it is performed under local anesthesia (paracervical block). Although this difference was found to be statistically significant in at least one study, it was too small (about 10 ml) to be clinically significant (*Andolšek, 1977*). Perforation of the uterus, cervical injury, and hemorrhage were more often associated with general anesthesia; convulsions and postabortal pyrexia, with local anesthesia (*Grimes, 1979*).

3 The overall rate of delayed complications following suction curettage is about the same for women discharged from the outpatient service of a hospital three to five hours after the procedure and for women remaining overnight in the hospital (*Andolšek, 1977*).

4 The theoretical advantages of flexible over rigid cannulae have not been confirmed by controlled studies. Observed differences in complication rates are small and more often than not appear to favor the rigid models. Other characteristics of the cannula, such as number and site of holes, may be as important as flexibility (*Andolšek, 1976; Antonovski, 1975*).

5 Failure to terminate the pregnancy occurs more frequently with evacuation of the uterus during the first two weeks after a missed period, especially during the first week, than with suction curettage later in the first trimester (*GWUMC, 1974*).

6 The incidence of heavy uterine bleeding, requiring blood transfusion and/or surgical evacuation of the uterus, is higher following the intra-amniotic instillation of prostaglandin $F_{2\alpha}$ than of hypertonic saline solution (*WHO, 1976*). The statement in the WHO report that these differences were not statistically significant is incorrect (*Cates, 1978b*) and was subsequently amended by Bygdeman (*1978*).

7 The safety of immediate IUD insertion after abortion has been demonstrated by many investigators (*Andolšek, 1972; Burkman, 1977; Hue, 1974; Nygren, 1973; Ross, 1978; Solheim, 1976; Tatum, 1972; Timonen, 1974*).

8 According to one controlled study the combined frequency of abortion-related and sterilization-related complications was not significantly increased when the two procedures were done concurrently, compared with a six weeks delay of the sterilization (*Cheng, 1979*).

Successful performance of first-trimester abortions by midwives and other paramedical workers has been reported from several countries (*Faundes, 1972; Karman, 1972b; Rahman, 1980; Scotti, 1976*). Controlled studies comparing the incidence of complications for abortions performed by physicians with abortions performed by paraprofessionals have not been found in the literature.

TABLE 19 Synopsis of studies of adverse outcome of next pregnancies following one or more induced abortions, by type of outcome and method of abortion

Outcome and location of study	Design[1]	Meth. of ab.[2]	Ind. ab.'s[3]	Controlled variables[4]	COMPARISON WITH GRAVIDA 1 Attr. risk[5]	Rel. risk[6]	Stat. sign.[7]	COMPARISON WITH GRAVIDA 2 AFTER LIVE BIRTH Attr. risk[5]	Rel. risk[6]	Stat. sign.[7]
Adverse outcome: Low birth weight[8]										
Upstate New York[9]	HP	VA	1	A,C,E,M,R	2.7	1.45	NS+	3.5	1.67	S
Singapore[10]	HP	MVA	1	R	5.8	1.44	NS+	—	—	—
Hungary[11]	RC−	SC	1	None	3.4	1.33	SSS	5.3	1.65	SSS
Hungary[11]	RC−	SC	2+	None	7.1	1.70	SSS	9.1	2.11	SSS
Copenhagen, Newcastle[12]	RC+	VA	1	A,H,S	1.3	1.26	NS−	0.3	1.05	NS+
Helsinki, Ljubljana, Stockholm[12]	RC+	VA	1	A,H,S	0.9	1.22	NS−	1.9	1.57	NS−
Upstate New York[9]	HP	Sal	1	A,C,E,M,R	1.3	1.21	NS+	2.0	1.36	NS+
Debrecen, Lodz, Warsaw[12]	RC+	SC	1	A,H,S	1.3	1.16	NS+	3.4	1.56	S
Skopje[13]	HP	MVA	1	None	0.3	1.06	NS−	3.9	3.31	NS−
Hawaii[14]	HP	MVA	1	A,R,Y	−0.5	0.90	NS+	0.4	1.08	NS+
Seattle[15]	RC+	MVA	1	A,M,P,Re	−0.8	0.88	NS−	—	—	—
Upstate New York[9]	HP	SC	1	A,C,E,M,R	−0.9	0.85	NS+	0.4	1.08	NS+
Boston[16]	RC+	MVA	1	P,R	−1.4	0.83	NS+	1.0	1.17	NS+
Helsinki, Ljubljana, Stockholm[12]	RC+	SC	1	A,H,S	−1.2	0.51	NS−	−0.8	0.61	NS−
Adverse outcome: Short gestation[17]										
Helsinki, Ljubljana, Stockholm[12]	RC+	VA	1	A,G,S	2.7	1.94	NS−	3.6	2.80	SS
Upstate New York[9,18]	HP	Sal	1	A,C,E,M,R	1.1	1.53	NS−	1.8	2.20	S
Debrecen, Lodz, Warsaw[12]	RC+	SC	1	A,H,S	2.5	1.32	NS+	1.6	1.19	NS+
Copenhagen, Newcastle[12]	RC+	VA	1	A,G,S	0.0	1.00	NS−	0.8	1.21	NS−
Seattle[15]	RC+	MVA	1	A,M,P,Re	−0.5	0.95	NS+	—	—	—
Helsinki, Ljubljana, Stockholm[12]	RC+	SC	1	A,H,S	−0.2	0.91	NS−	0.3	1.20	NS−
Upstate New York[9,18]	HP	VA	1	A,C,E,M,R	−0.4	0.79	NS−	0.1	1.08	NS−
Upstate New York[19,18]	HP	SC	1	A,C,E,M,R	−0.5	0.76	NS+	0.2	1.14	NS−
Boston[16]	RC+	MVA	1	P,R	−1.9	0.72	NS+	0.0	1.00	NS−
Hawaii[14]	HP	MVA	1	A,R,Y	−2.9	0.57	NS+	1.7	1.38	NS+
Adverse outcome: Midtrimester abortion[19]										
Debrecen, Lodz, Warsaw[12]	RC+	SC	1	A,G,S	3.8	2.78	SSS	3.7	2.70	SSS
California[20]	RC+	MVA	1	A,G	1.8	1.81	NS+	—	—	—
California[20]	RC+	MVA	2+	A,G	4.6	3.13	SSS	—	—	—
Helsinki, Ljubljana, Stockholm[12]	RC+	SC	1	A,G,S	1.8	1.76	NS−	2.6	2.80	NS−
Copenhagen, Newcastle[12]	RC+	VA	1	A,G,S	−0.1	0.90	NS−	−0.3	0.77	NS−
Hawaii[21]	HP	MVA	1	A,C,R,Y	−0.9	0.72	NS−	−0.3	0.80	NS−
Helsinki, Ljubljana, Stockholm[12]	RC+	VA	1	A,G,S	−0.6	0.71	NS−	0.1	1.09	NS−

1. HP = Historical prospective; RC+ = Retrospective cohort, abortion experience ascertained before adverse outcome was known or suspected; RC− = Retrospective cohort, no information when abortion experience was ascertained.
2. Method of abortion: SC = Surgical curettage; VA = Vacuum aspiration (suction curettage); MVA = Mostly VA; Sal = Saline instillation.
3. Number of induced abortions preceding the index pregnancy (2+ = 2 or more); no other prior pregnancy.
4. A = Age of mother; C = County of residence; E = Education; G = Gestation at booking; H = Height of mother; M = Marital status; P = Payment status; R = Race or ethnicity; Re = Religion; S = Smoking habit during pregnancy; Y = Year of outcome.
5. Attributable risk = Difference in frequency of adverse outcome between women with abortion experience and comparison group, expressed in percent of births or pregnancies at risk.
6. Relative risk = Frequency of adverse outcome in women with abortion experience divided by frequency in comparison group.
7. Statistical significance: S = Significant at the 0.05 level; the probability that a difference as great as or greater than found would occur as a result of random variation is one in twenty. SS = Significant at the 0.01 level. SSS = Significant at the 0.001 level. NS+ = Not significant; the probability that a difference as great as or greater than found is greater than one in twenty and the number of cases is large enough to offer at least an 80 percent chance of detecting a doubled risk. NS− = The chance of detecting a doubled risk is less than 80 percent. These probabilities were computed by W. Cates, Jr. of the Centers for Disease Control. His help is gratefully acknowledged.
8. Generally live infants weighing less than 2,500 (or 2,501) gram. Rates per 100 births.
9. *Logrillo, 1980.*
10. *Hogue, 1979, 1980.*
11. *Hungary, 1980.*
12. *World Health Organization, 1979.*
13. *Hogue, 1975.* Method: 64 percent suction curettage, 24 percent surgical curettage, 12 percent other.
14. *Chung, 1980a.*
15. *Daling, 1977.*
16. *Schoenbaum, 1980.*
17. Generally live infants born less than 37 weeks from onset of last menstrual period. Rates per 100 births.
18. Less than 33 weeks from LMP.
19. Rates per 100 pregnancies at risk.
20. *Harlap, 1979.*
21. *Chung, 1980b.*

TABLE 20 Total and major complications per 100 women, by gestation, procedure, sterilization, and anesthesia, for total patients and for patients with follow-up (FU): United States, 1971/75

Gestation (weeks), procedure, sterilization, and anesthesia	TOTAL COMPLICATIONS		MAJOR COMPLICATIONS	
	Total patients	Patients with FU	Total patients	Patients with FU
All patients				
6 or less	7.2	10.3	0.4	0.6
7-8	4.7	6.6	0.3	0.4
9-10	5.6	7.7	0.4	0.6
11-12	8.2	9.9	0.8	1.0
13-14	17.0	18.1	1.4	1.6
15-16	33.1	36.2	1.9	2.1
17-20	39.9	47.4	2.2	2.5
21 or more	36.1	47.5	2.3	2.9
12 or less	6.0	8.1	0.4	0.6
13 or more	31.3	35.5	1.9	2.2
All gestations	12.3	14.9	0.8	1.0
Patients without preexisting complications or concurrent sterilization				
6 or less	7.2	10.3	0.2	0.3
7-8	4.4	6.1	0.2	0.3
9-10	5.3	7.3	0.4	0.5
11-12	7.7	9.1	0.6	0.8
13-14	16.4	17.0	1.0	1.1
15-16	33.1	35.7	1.4	1.5
17-20	39.7	46.7	1.9	2.3
21 or more	34.6	45.2	1.7	2.2
12 or less	5.7	7.6	0.4	0.5
13 or more	31.0	34.6	1.5	1.7
All gestations	21.1	14.5	0.7	0.8
Procedure[1]				
Suction curettage[2,3]	4.7	6.5	0.3	0.4
D & E[3,4]	5.5	6.7	0.6	0.6
Saline[3,5]	38.0	47.0	1.7	2.1
Prostaglandin[3,5]	53.1	54.5	2.8	2.6
Hysterotomy[6]	47.0	48.1	13.9	15.2
Hysterectomy	49.5	48.8	13.4	13.4
Suction curettage[1,3]				
6 or less	6.0	9.2	0.2	0.3
7-8	4.0	5.7	0.2	0.3
9-10	4.7	6.6	0.3	0.4
11-12	5.2	6.5	0.4	0.6
D & E[1,3,4]				
13-16	5.6	6.8	0.6	0.7
17 or more	4.8	5.3	0.5	0.5
Saline[1,3,5]				
13-16	42.1	50.9	1.7	1.7
17 or more	36.3	45.4	1.7	2.2
Prostaglandin[1,3,5]				
13-16	55.0	55.5	2.8	2.1
17 or more	51.9	53.9	2.8	3.0
Tubal sterilization[1,2,7]				
Not done	4.7	6.5	0.3	0.4
By laparotomy	22.6	24.5	3.2	3.1
By laparoscopy	7.6	8.5	0.8	1.2
Anesthesia[1,2,3,7]				
Local	4.2	6.0	0.3	0.4
General	5.6	7.5	0.3	0.5

1. Without preexisting complications.
2. At 12 weeks of gestation or earlier.
3. Without tubal sterilization.
4. Instrumental evacuation at 13 weeks of gestation or later.
5. Intra-amniotic instillation.
6. With tubal sterilization.
7. Aborted by suction curettage.

SOURCE: *United States, 1978.*

Document #12

Late Effects of Induced Abortion
Hypothesis or Knowledge?

Willard Cates, Jr., M.D., M.P.H.

Recent local, state and federal regulations intending to provide "informed consent" for women considering termination of pregnancy have misrepresented the current state of knowledge about certain long-term complications: the alleged risks are presented to the patient as if they were scientific facts rather than still-unproven hypotheses. While it is possible that some late sequelae are associated with previously induced abortions, there is no agreement in the scientific literature on the magnitude of the risks, if any. Moreover, few studies adequately define the particular method of induced abortion whose effects they are investigating. The current data do not support firm conclusions about induced abortion either causing or not causing any of the alleged long-term complications.

From the Abortion Surveillance Branch, Family Planning Evaluation Division, Center for Disease Control, Atlanta, Georgia.

Address reprint requests to: Willard Cates, Jr., M.D., M.P.H., Chief, Abortion Surveillance Branch, Center for Disease Control, Atlanta, Georgia 30333.

Recent legislation has been introduced at local, state and national levels to regulate the content of information provided to women requesting abortion services.[7] The primary purpose of this legislation is to provide more comprehensive "informed consent" for women considering termination of pregnancy. However, many regulations do not objectively represent the current state of knowledge about certain long-term complications; the alleged risks are presented to the patient as if they were scientific conclusions rather than still-unproven hypotheses. For example, one regulation requires that the woman be told that abortion produces "sterility, increase in the incidence of premature births, tubal pregnancies, and stillbirths in subsequent pregnancies."[8]

While it is possible that some of these complications are associated with previously induced abortions, there is no agreement in the scientific literature on the magnitude of the risks, if any. Moreover, few studies adequately define the particular method of induced abortion whose effects they are investigating. In this brief article, I will describe the design complexities of the different studies on the long-term effects of induced abortion and summarize the findings of the published analytic studies dealing with such alleged complications as sterility, ectopic pregnancy, spontaneous abortion, prematurity, pregnancy complications and birth defects.

Variation in the Abortion Procedure

The term *induced abortion* is used generically to describe many different procedures (Table I). The most obvious variable potentially affecting long-term complications from induced abortion is whether it was performed under legal or illegal conditions. Clandestine procedures are presumably more risky than those performed by qualified physicians in hospital or clinic settings; yet, many of the published studies were conducted in countries where induced abortion has not been legalized, such as Greece, Israel and Taiwan. Thus, the inferences drawn from these studies cannot be generalized to the United States, where, on the whole, safe, legal abortion is available at the request of the woman.

Other variables also affect long-term complications from induced abortion. Factors not directly related to the abortion procedure itself influence its outcome (Table I). Such variables as the patient's demographic profile, medical risk factors, the fa-

cility in which the procedure is performed, the use of prophylactic antibiotics and the type of postabortion contraception may independently influence the incidence and/or spectrum of postabortion morbidity. Other factors related to the technical aspects of the procedure may also affect the complication rate. Such variables as type of anesthesia, method of dilatation, amount of dilatation, type of instrumentation and length of operative procedure have been shown to affect short-term abortion morbidity and thus potentially influence the long-term sequelae. Finally, any woman undergoing a concurrent sterilization procedure with her abortion will obviously be at reduced risk of suf-

Table I *Some Variables Potentially Affecting Long-Term Complications from Induced Abortions*

Category	Variable
Legal status of induced abortion	Legal
	Illegal—physician-induced
	Illegal—nonphysician induced
	Illegal—self-induced
Patient's demographic profile	Age
	Race
	Gravidity
	Parity
	Socioeconomic status
Patient's medical risk factors	Preexisting conditions
	Gestational age
	Position of the uterus
	Number of previous induced abortions
	Number of previous spontaneous abortions
Operator's skill	Level of training
	Previous abortion experience
	Innate ability
Type of anesthesia	None
	Local
	General
	Regional
	Combination
Type of dilatation	None
	Metal
	Plastic
	Laminaria—single
	Laminaria—multiple
	Chemical
	Vibrator
Amount of dilatation	As recorded in millimeters
Type of instrumentation	Uterine sound
	Flexible suction curette
	Rigid suction curette
	Sharp curette
	Ring forceps
	Intrauterine catheter
	Combination
	Postevacuation sharp curette
Size of instrumentation	As recorded in millimeters
Length of operative procedure	As recorded in minutes or hours

Table I *(continued)*

Category	Variable
Type of abortifacient	Saline Prostaglandin Urea Oxytocin Combination
Type of facility and/or service	Hospital inpatient Hospital outpatient Type of hospital Free-standing clinic Physician's office
Use of prophylactic antibiotics	No Yes Type of antibiotic
Concurrent sterilization	Laparoscopic cauterization Laparoscopic clip Minilaparotomy with ligation Abdominal laparotomy with ligation Vaginal approach with ligation Hysterectomy
Postabortion contraception	None IUD inserted after uterine evacuation Oral contraceptives initiated Barrier methods
Short-term complications	Pelvic infection Cervical rupture/laceration Uterine rupture Uterine perforation Uterine synechiae Rh sensitization

fering any future pregnancy-related morbidity.

Because of the many technical factors having a possible effect on the long-term complications of induced abortion, studies which focus on aggregated abortion procedures should be viewed with caution. The recent multicenter World Health Organization study has found that the use of larger-caliber dilatation and sharp curettage increases the likelihood of spontaneous abortion, prematurity and low-birth-weight infants in future pregnancies.[13] However, suction curettage was generally associated with a lower increased risk in some countries and no increased risk in others. In the United States, nearly 96% of all abortions performed at 12 weeks are by suction rather than sharp curettage.[3] Therefore, future studies must carefully define the particular abortion procedure whose influence on long-term complications is being evaluated. Without adequate specification of the abortion procedures used, the aggregated data from all "induced abortions" may be misleading.

Differences in Research Design and Analysis

Different research approaches have been used to determine whether induced abortion has any long-term sequelae. Some studies are well designed and permit valid inferences, while others have a weaker scientific foundation and are at best suggestive. Moreover, even the most careful investigation may suffer from one of several potential biases which could affect its results.

Many studies are simply descriptions of the previous abortion histories of women who experience one of the possible long-term complications, referred to as case-series reports; no control populations are provided. Without appropriate comparison groups, the value of these uncontrolled observations is questionable. For example, documenting the prevalence of prior induced abortion in women who have subsequent ectopic pregnancies provides no information on what the baseline prevalence of induced abortion is in the population being studied.[11]

Table II *Sources of Potential Bias in Studies on Long-Term Effects of Induced Abortion*

Source	Definition	Example
Selection bias	Differences in selecting the study population and controls	Use of selected registry to identify previous aborters but not controls
Information bias	Differences between the study population and controls in ascertaining a history of previous abortion	Nonadmission of previous abortion, "biased" recall if adverse outcome occurs
Confounding	Differences between the study population and controls in the distribution of variable(s) associated with both induced abortion and adverse sequelae	Age, birth order, pregnancy order, smoking, socioeconomic status, etc.
Chance	Probability that an observed association may be due to chance	Too small a study population to allow achievement of statistical significance, inappropriate method of statistical analysis

Other investigations within various countries have analyzed the secular trends in complications before and after legal abortion was available. Although this approach may find a temporal association between the availability of legal abortion and a particular outcome, it does not permit causal inferences to be drawn. For example, if induced abortion is found to be temporally associated with adverse outcomes, other confounding factors may be more directly involved. As evidence, in England the increasing incidence of ectopic pregnancy was found to be more strongly related to an increased rate of pelvic inflammatory disease rather than to the increasing number of induced abortions.[1]

Analytic studies are those which provide comparison groups. However, even with analytic studies, at least four sources of bias can occur which affect the results (Table II): (1) *Selection bias* refers to differences used in selecting the study population and the controls; for example, if a selected registry, such as women attending an infertility clinic, is used to identify previous aborters but controls are chosen from women seen in a prenatal clinic, selection bias might occur. (2) *Information bias* involves differences in ascertaining a previous abortion history between the study population and controls; for example, women who suffer adverse outcomes might be more likely to "recall" a prior induced abortion to explain their subsequent problem than women who have normal outcomes. (3) *Confounding* can occur if there are differences between the study population and controls in the distribution of variables associated with *both* induced abortion and the long-term complications. Such variables as age, birth order, pregnancy order, smoking, socioeconomic status and history of spontaneous abortion all have been shown to be related to women seeking induced abortions as well as to other pregnancy-related morbidity. (4) *Chance* must be ruled out as an explanation for either an observed association or an observed nonassociation. For example, selection of too small a study population to allow achievement of statistical significance would lead to errors in concluding that there is no association when in fact there really is. Alternatively, inappropriate use of statistical methods can lead to finding an association which might not be real.

Because of these differences in research design and the possibility of sources of bias, no single study should form the basis for establishing a causal relationship. Rather, each study should be considered separately for its strengths and weaknesses. Those with serious design deficiencies should not be given much weight. Those with the best study design should be viewed *in toto* to see if their results support each other. The more consistent the findings among the best-quality studies, the more likely that a causal factor exists.

Summary of Available Literature

The available analytic case-control and cohort studies generally form no consistent pattern (Table III). The two published investigations from the United States have found no effect of induced abortion on any of the subsequent adverse out-

Table III *Summary of Results of Case-Control and Cohort Studies on Outcome of Pregnancy After Induced Abortion*

Study	Country	Years of study	Status of abortion	Effects*					
				Sterility	Ectopic pregnancy	Spontaneous abortion	Low birth weight/ prematurity	Complications of pregnancy	Birth defects
Daling (1977)	USA	1972-74	Legal	--	No	No	No	--	No
Kline (1978)	USA	1974-76	Legal	--	--	No	--	--	--
Schoenbaum (1977)†	USA	1975-76	Legal	--	--	--	No	No	No
Chung (1977)†	USA	1970-74	Legal	--	No	Yes[a]	No	No	No
Bracken (1978)†	USA	1974-76	Legal	--	--	--	--	--	No
Levin (1978)†	USA	1976-78	Legal	--	--	2.7[b]	--	--	--
Logrillo (1978)†	USA	1970-76	Legal	--	--	1.9	1.7	Yes[c]	No
Daling (1975)	Taiwan	1965-68	Illegal	--	--	No	No	--	--
Roht (1973, 1976)	Japan	1971	Legal	No	No	Yes[d]	Yes[e]	--	--
Hayashi (1966)	Japan	1961-62	Legal	No	--	--	--	--	--
Moriyama (1966)	Japan	1961-62	Legal	--	--	1.6	1.4	--	--
Furusawa (1966)	Japan	1952-64	Legal	--	--	--	--	No	--
Sawazaki (1966)	Japan	1959-64	Legal	--	No	--	--	--	--
Trichopoulos (1976)	Greece	1973-74	Illegal	3.4	--	--	--	--	--
Panayotou (1972)	Greece	1970-71	Illegal	--	2.4	--	--	--	--
Papavangelou (1973)	Greece	1969-70	Illegal	--	--	--	2.1	--	--
Pantelakis (1973)	Greece	1966-68	Illegal	--	--	--	2.1	--	--
Harlap (1975)	Israel	1966-68	Illegal	--	--	--	1.3	Yes[f]	1.3
Wright (1972)	England	1971	Legal	--	--	9.4	No	--	--
Liu (1972)	England	1971-72	Legal	--	--	6.3	--	--	--
Richardson (1976)	England	Not given	Legal	--	--	6.3	2.5	--	--
Lembrych (1972)	Poland	1966-68	Legal	--	--	--	2.6	Yes[f]	--
Dziewulska (1973)	Poland	Not given	Legal	--	2.7	2.1	2.3	Yes[g]	--
Drac (1970)	Czechoslovakia	1960-68	Legal	--	--	--	1.4	--	--
Heczko (1970)	Czechoslovakia	1967-69	Legal	--	--	--	No	No	--
Hren (1974)	Yugoslavia	1971-73	Legal	--	No	--	--	--	--
Hogue (1975)	Yugoslavia	1968-69	Legal	No	--	No	No	--	--
Voight (1975)	East Germany	1972-74	Legal	--	--	--	No	--	--
Knorre (1976)	East Germany	1972-74	Legal	--	--	--	4.1	Yes[h]	--

*Relative risk of pregnancy outcome among women having previous induced abortions compared to controls
†Preliminary report
--Not studied
No = No significant relationship
[a]Increased risk of spontaneous abortion at 16-20 weeks
[b]With ≥ 2 previous abortions, not with 1 abortion
[c]Increased risk of antenatal hemorrhage, preeclampsia and prolonged labor
[d]Risk of spontaneous abortion increased with number of previous abortions
[e]Risk of prematurity increased with number of previous abortions
[f]Increased risk of retained placenta
[g]Increased risk of antenatal and postpartum hemorrhage
[h]Increased risk of prolonged labor and retained placenta
[i]Increased risk of retained placenta

comes they evaluated.[6,8] Preliminary results from five other American studies are available.[2,4,9,10,12] Some imply that shortened gestation in subsequent pregnancies, either as spontaneous abortion or premature labor, may be associated with prior induced abortion.[4,9,10] Two preliminary studies[4,12] have found no association between induced abortion and either low-birth-weight infants or complications of pregnancy, while one report did.[10] No effect of previous abortions was found on subsequent birth defects among any of the American studies.[2,4,6,10,12] Because further analysis may affect the final results, the ultimate interpretation of these preliminary reports should be based on the final published analysis.

In analytic studies from nine other countries, the results have also formed no consistent pattern (Table III). The one study which found a risk of subfecundity was conducted in a study where abortion was illegal; the others have found no effect. Two of five investigations showed abortion was associated with ectopic pregnancy; six of eight, with spontaneous abortion; 10 of 15, with prematurity; four of six, with complicated preg-

nancies; and one of one, with birth defects.

What To Tell Your Patient

For the clinician counseling a pregnant woman about the risks of pregnancy termination versus those of pregnancy continuation, the results of the published studies provide no answers. In view of the inconsistencies among the above analytic studies, my suggestion is to advise patients that the current data do not support firm conclusions about induced abortion's either causing or not causing any of the alleged long-term complications. If some late sequelae are eventually shown to be casually associated with prior induced abortion, it is likely that they are related to particular abortion techniques, such as the manner and caliber of dilatation, the method of curettage used to evacuate the uterus or the stage of gestation at which the abortion was performed. Moreover, if present, any risks of subsequent adverse reproductive outcomes would probably be increased for women who had more than one previous induced abortion.

Given the uncertainty of the present state of knowledge about the long-term complications of induced abortion, the dogmatic statements contained in the current "informed consent" provisions of local, state and national regulations are misleading. Pregnant women who may wish to have subsequent pregnancies should receive the most accurate information available to allow them to assess the risks of terminating their pregnancies versus the risks of continuing them. My advice is to tell them that we currently do not know the answer.

Acknowledgments

I wish to thank the following individuals for their contributions to this paper: Diana B. Petitti, M.D.; Carol L. R. Hogue, Ph.D.; Howard W. Ory, M.D., M.Sc.; Julian Gold, M.B.B.S.; and Carl W. Tyler, Jr., M.D.

References

1. Beral V: An epidemiologic study of recent trends in ectopic pregnancy. Br J Obstet Gynaecol 82:775, 1975
2. Bracken MB, Holford T: Induced abortion and congenital malformations in offspring of subsequent pregnancies. Am J Epidemiol (in press)
3. Center for Disease Control: Abortion surveillance, 1976. CDC, August 1978
4. Chung CS, Steinhoff PG, Mi MP, et al: Long-term effects of induced abortions. Presented at the 105th Annual Meeting of the American Public Health Association, Washington, DC, October 31, 1977
5. City of Akron, Ohio: Regulation of abortions. Adopted March 1978
6. Daling JR, Emanuel I: Induced abortion and subsequent outcome of pregnancy in a series of American women. N Engl J Med 297:1241, 1977
7. Donovan P: Local efforts to block abortion clinics rebuffed. Fam Plann/Pop Reporter 6:67, 1977
8. Kline J, Stein Z, Susser M, et al: Induced abortion and spontaneous abortion: No connection? Am J Epidemiol 197:290, 1978
9. Levin A, Schoenbaum SC, Monson RR, et al: Induced abortion and the risk of spontaneous abortion. Presented at the 106th Annual Meeting of the American Public Health Association, Los Angeles, California, October 19, 1978
10. Logrillo V: Pregnancy outcome after induced abortion. Presented at the Workshop on the Effect of Induced Abortion on Subsequent Reproductive Function, National Institutes of Health, Bethesda, Maryland, January 25, 1979
11. Pontifex G, Trichopoulos D, Karpathios S: Hysterosalpingography in the diagnosis of infertility (statistical analyses of 3,437 cases). Fertil Steril 23:829, 1972
12. Schoenbaum SC, Monson RR, Stubblefield PG, et al: Outcome of the delivery following an induced or spontaneous abortion. Am J Obstet Gynecol (in press)
13. World Health Organization Task Force on the Sequelae of Abortion: Gestation, birthweight, and spontaneous abortion in pregnancy after induced abortion. Lancet 1:142, 1979

References for analytic studies in countries other than the United States are available upon request from the author.

Document #13

Induced Abortion and Spontaneous Fetal Loss In Subsequent Pregnancies

CHIN S. CHUNG, PHD, ROY G. SMITH, MD, MPH,
PATRICIA G. STEINHOFF, PHD, AND MING-PI MI, PHD

Abstract: The effect of induced abortion on spontaneous pregnancy loss in subsequent pregnancies was studied based on 3,416 pairs of matched data in a follow-up investigation. Pregnancy outcome was examined also in relation to abortion procedure, gestation length at time of abortion, and number of previous abortions. In general there was no significant association between prior induced abortion and risks of pregnancy loss with the relative risks of 1.10, 0.88, and 0.81 for the first to third trimester respectively. A slight increase of first-trimester spontaneous loss was noted with the D&C/Suction procedure and early induced abortion (<9 weeks). The D&C procedure was associated with non-significant increase of second-trimester loss with the relative risk of 1.59. *(Am J Public Health* 1982; 72:548–554.)

Induced abortion is considered the most commonly used surgical procedure in the United States[1] and accounts for about 30 per cent of all known pregnancies.[2] Reported results of studies relating history of induced abortion to subsequent spontaneous abortion demonstrate inconsistencies among different countries as shown by summaries of international studies[2,3] and a World Health Organization study spanning several countries.[4] These conflicting results are difficult to evaluate in view of the great variations among countries in the legal status of induced abortion, socioeconomic condition, health care standard, abortion procedure, and study design.

Conflicting observations also prevail in studies carried out in the United States, where conditions could be considered more homogeneous. On the one hand, no association between prior induced abortion and subsequent spontaneous abortion was detected by Kline, *et al,* in New York in a case-control study[5] and by Daling and Emanuel in Seattle in a matched-pair cohort study.[6] On the other hand, Harlap, *et al,* reported an increase of mid-trimester spontaneous abortion among nulliparous women with prior induced abortion compared with control nulliparous women in the San Francisco Bay area.[7] The increase was largely limited to women who had abortion procedure in early years after the legalization of abortion. More recently, Levin, *et al,* reported a twofold to threefold increase in risk of first-trimester spontaneous abortion and losses up to 28 weeks of gestation only for women who had two or more prior induced abortions.[8]

The present study reports the results of a relatively large follow-up investigation in which outcomes of subsequent pregnancies of a cohort of women with a history of induced abortion are compared with those of a matched control group. Furthermore, these pregnancy outcomes were evaluated specifically in relation to information on abortion procedure used, use of laminaria* in dilatation of cervix, and other pertinent reproductive characteristics of the women at the time of induced abortion.

Materials and Methods

Subsequent pregnancies were followed up on a cohort of women who had documented records of induced abortion. The abortion cohort of 16,961 women with 18,786 abortions is made up of nearly all women who had experienced induced abortion during the period of March 1970 through June 1974 in the state of Hawaii following the legalization of induced abortion in March 1970. The cohort was derived from an earlier research project to study demographic, behavioral, and medical aspects of women undergoing induced abortion.[9–14] Medical and demographic information was obtained from hospital records on each induced abortion by personnel trained and asigned in the earlier project. The information included date of abortion, length of gestation at time of abortion, abortion procedure used, use of laminaria, complications associated with procedure, and reproductive history.

In order to follow this cohort for subsequent pregnancies, their records were linked with vital registration records of live births and spontaneous fetal deaths reported to the State Department of Health for the period of 1970 through 1976. The State of Hawaii requires reporting of fetal death at any stage of gestation. Record linkage was based on first name, maiden last name, age, and race of the women, and date and hospital of the subsequent event. Hospital records

Address reprint requests to Chin S. Chung, PhD, Professor of Public Health and Genetics, Department of Public Health Sciences, University of Hawaii, 1960 East-West Road, Honolulu, HI 96822. Dr. Smith is Professor of Public Health, Department of Community Health Development; Dr. Steinhoff is Professor of Sociology; and Dr. Mi is Professor of Genetics; all are with the University of Hawaii. This paper, submitted to the Journal July 9, 1981, was revised and accepted for publication February 1, 1982.

Editor's Note: See also related editorial p 534 this issue.

© 1982 American Journal of Public Health

*Laminaria is a dried marine plant that expands in the presence of moisture.

of these pregnancy outcomes were reviewed for detailed information on type of pregnancy outcome, reproductive history, weeks of gestation, pregnancy complications, labor and delivery complications, postpartum complications, birthweight, and congenital malformations.

A control group was formed as follows. For each woman who had a subsequent pregnancy outcome in the abortion cohort, one woman was selected from the merged file of individuals who had either live birth or spontaneous abortion. The file was derived from the reports of live births and spontaneous abortions of the Hawaii State Health Department. Excluded from the file were all women who had any record of induced abortion as ascertained through the induced abortion cohort and/or the separate file of induced abortions registered with the Health Department. In this process the control women were matched pairwise with the abortion women for race, age, and time of the pregnancy outcome (± one month).

For the purpose of this study, races were classified into five categories: Caucasians, Hawaiians and part-Hawaiians, Filipinos, Orientals, and Others. Caucasians and Filipinos represent the respective racially unmixed groups. Orientals include the unmixed groups of Japanese, Chinese, and Koreans, who are more homogeneous in their cultural and socioeconomic background. Hawaiians and part-Hawaiians were pooled together because of a small number of unmixed Hawaiians and some cultural similarity. The "Other" group consists of heterogeneous entities including other unmixed ethnic groups and interracial crosses excluding part-Hawaiians. Reproductive history of the woman was not considered in the matching process since the information was seldom available in fetal death certificates. Hospital records of the control pregnancies were searched and reviewed as with the abortion cohort pregnancies. For the purpose of data analysis, spontaneous fetal loss was classified into three groups on the basis of completed gestation length: first-trimester (≤14 weeks), second-trimester (15–27 weeks), and third-trimester (≥28 weeks) losses.

The matching process produced a total of 3,589 pairs of observations for the abortion and control groups. However, detailed reviews of hospital records revealed a small number of incorrect entries among those fetal deaths reported as spontaneous fetal deaths to the State Health Department. There were 12 cases of menstrual induction (eight in the abortion group and four in the control group), six cases of septic abortions equally distributed between the two groups, and 18 cases of induced abortion (13 in the abortion group and five in the control group). All of the pairs with these types of discrepancies were excluded from pairwise comparisons. Excluded also were those pairs of observations in which intrauterine devices (IUD) *in situ* were detected at the time of delivery or spontaneous abortion and the control women who had documented history of induced abortion (79 cases) based on hospital records. When these exclusions were made, there were 3,416 pairs of observations for matched comparison. However, all valid data were used when analysis was confined to the abortion cohort.

The data presented an interesting problem from an analytical point of view because of the fact that they were matched on some covariables but not on others. The methods for matched data developed for case-control studies[15,16] are not directly applicable to the present data. We decided against use of a method modified from the case-control method[15] (personal communication with Dr. Holford) because of too stringent selection of data resulting in great loss of information. The observation of Rubin[17] that "the combination of regression adjustment in matched samples generally produces the least biased estimate" of the effect led us to choose the method of logistic regression[18] for analysis of the present data. In addition, the technique can accommodate as many covariables as needed and lead to estimation of relative risk (odds ratio) adjusted for the covariables. Furthermore, the result of the analysis could be used in adjusting the data for evaluation of abortion techniques to be discussed later. Variables considered in addition to the matched variables were resident island (Oahu = 1, otherwise

TABLE 1—Coefficients of Logistic Regression and Their Standard Errors for Spontaneous Fetal Losses by Trimester

	First-Trimester	Second-Trimester	Third-Trimester
Constant	2.0831	1.1585	−0.3202
Year of Event	−0.0930 ± 0.0374*	−0.0468 ± 0.0598	−0.0898 ± 0.1210
Mother's Age	0.0712 ± 0.0130**	0.0226 ± 0.0207	0.1035 ± 0.0419*
Race			
Hawaiian or Part-Hawaiian	−0.4523 ± 0.1475**	−0.1910 ± 0.2360	0.0795 ± 0.4774
Filipino	−0.1609 ± 0.1637	−0.5177 ± 0.2623*	−0.3180 ± 0.5303
Oriental	0.0537 ± 0.1427	−0.3697 ± 0.2285	−0.5256 ± 0.4622
Other	−0.4301 ± 0.2285	−0.0804 ± 0.3659	0.1830 ± 0.7400
Residence Island	0.0059 ± 0.1389	0.3627 ± 0.2226	−0.3679 ± 0.4501
Pregnancy Order	0.0445 ± 0.0377	0.0405 ± 0.0604	−0.1911 ± 0.1222
Current Marital Status	1.2073 ± 0.1468**	0.8459 ± 0.2342**	1.0689 ± 0.4733*
History of Induced Abortion	0.0943 ± 0.1068	−0.1331 ± 0.1710	−0.2143 ± 0.3459
Exposure Odds Ratio and Confidence Limits	1.10 (0.89–1.35)	0.88 (0.63–1.22)	0.81 (0.41–1.59)

*P < .05
**P < .01

TABLE 2—Matched-Pair Analysis of First- and Second-Trimester Spontaneous Fetal Loss for Specific Combinations of Reproductive History

Abortion	Control	Number of Pairs: First-Trimester	Number of Pairs: Second-Trimester
A1	S1		
+	+	0	0
+	−	1	0
−	+	3	1
−	−	36	39
Total		40	40
χ^2_1		0.25	0
RR (C.L.)		0.33(−0.42–1.09)	−
A1	P1		
+	+	2	0
+	−	13	4
−	+	13	5
−	−	305	324
Total		333	333
χ^2_1		0.04	0
RR (C.L.)		1.00(0.23–1.77)	0.80(−0.25–1.85)
A1	P0		
+	+	3	0
+	−	31	13
−	+	24	18
−	−	476	503
Total		534	534
χ^2_1		0.65	0.52
RR (C.L.)		1.29(0.60–1.98)	0.72(0.21–1.24)

A1 = nulliparous with single induced abortion; S1 = nulliparous with single spontaneous abortion; P1 = only single previous birth; P0 = no previous pregnancy.

= 0), pregnancy order, and marital status of woman (married now = 0, not married = 1).

Possible effects of induced abortion were further studied by making comparisons between specific subgroups of the abortion and control groups selected on the basis of reproductive history of the women with due allowance for the matched variables. This analysis included comparisons of pregnancy outcomes of nulliparous women of the abortion cohort who had only one previous induced abortion with three subgroups of the control women: pregnancies of women with no prior pregnancy, only one prior spontaneous abortion, or only one prior live birth. The nulliparous abortion cohort is of special interest because this group of women may want children later.

Finally, factors associated with induced abortion at the time of procedure were studied in relation to pregnancy outcome by comparing subgroups of the abortion group with the control on the data stratified by multivariate confounder scores of Miettinen.[19] Essentially this analytical method enables a comparison of two groups adjusting for a number of confounding variables. The discriminant function coefficients used were the same as the logistic regression coefficients described above on the same set of confounder variables. Factors studied in relation to abortion were maternal age and gestation weeks at time of procedure, number of previous induced abortions experienced, type of procedure, and use of laminaria.

Factors associated with induced abortion were further studied within the abortion cohort pregnancies in order to check consistency with the earlier comparison and to allow for correlation between certain factors. Thus possible effects of use of laminaria, multiple induced abortions, and gestation stage at induced abortion were examined by the χ^2 method of Mantel and Haenszel[20] on data stratified by abortion procedure and pregnancy order of the subsequent pregnancy. This analysis was limited to first- and second-trimester fetal losses because of small numbers of observations in third-trimester pregnancy loss.

Results

Table 1 shows the results of the logistic regression analysis of spontaneous fetal losses by trimester. Fetal losses of all types were consistently associated with marital status of the women, with a significantly higher risk for unmarried women. When all of the covariables were allowed for, none of the three types of fetal losses was found to be significantly associated with history of induced abortion. The estimated relative risks with their 95 per cent confidence limits were 1.10 (0.89–1.35), 0.88 (0.63–1.22), and 0.81 (0.41–1.59) for first-, second-, and third-trimester fetal losses respectively.

Table 2 shows the matched comparisons of first- and second-trimester fetal loss rates of the abortion cohort pregnancies with a history of only one induced abortion (A1) with the three subgroups of control pregnancies, those preceded by only one spontaneous abortion (S1), only one live birth (P1), and no previous pregnancy (P0). Because of limited data, third-trimester fetal loss was excluded from this comparison. In these comparisons the originally matched variables remained matched resulting in considerable reduction in sample size. The association was tested by McNemar's χ^2 test and the relative risk was estimated from discordant pairs.[21] There was little information for the comparisons of the A1 and S1 groups. For the A1 vs P1 contrast, the rates of first- and second-trimester fetal losses were similar with the respective relative risks of 1.00 and 0.80. The A1 vs P0 comparisons had more stable estimates of rates and relative risks of fetal losses, although no significant association was found between previous induced abortion and first- or second-trimester spontaneous loss with the respective relative risks of 1.29 and 0.72.

The results of testing specific factors associated with immediately previous induced abortion are summarized in Table 3 in terms of relative risk (RR) based on the method of Mantel-Haenszel as applied to the data stratified by the multivariate confounder scores. The data were grouped into five strata. Each subgroup of the cohort pregnancies characterized by a factor at previous induced abortion (e.g., use or non-use of laminaria) was compared with the entire control group with 3,416 observations for test of association with one degree of freedom. The relative risk estimate in Table 3 represents the ratio of the risks (odds) of specific type of fetal loss for the abortion cohort to that of the control group after adjusting for the set of confounding factors described earlier.

TABLE 3—Relative Risks of Spontaneous Fetal Loss for Subsequent Pregnancies of Women with History of Induced Abortion as Classified by Variables Associated with Induced Abortion

		Relative Risk for Fetal Loss		
		First-Trimester	Second-Trimester	Third-Trimester
Procedure				
D&C		0.97	1.59	—
Suction		1.06	0.88	0.90
D&C/Suction		1.33*	0.78	0.79
Other		1.06	0.45	0.89
Use of Laminaria	No	1.14	0.94	0.31
	Yes	1.10	0.76	1.04
Gestation Weeks at Last Induced Abortion	<9	1.40**	0.91	0.54
	≥9	0.95	0.87	0.84
Number of Previous Induced Abortions	1	1.15	0.91	0.61
	>1	1.01	0.80	1.68

*P < .05
**P < .01

Of the four factors studied (abortion procedure, use of laminaria, gestation length at time of procedure, and number of previous induced abortions), the D&C/Suction procedure and early induced abortion (<9 weeks of gestation) were found to be significantly related to first-trimester spontaneous abortion. The respective relative risks indicate approximately 30 per cent and 40 per cent increases in the risk due to these factors. There was an apparent increase in the relative risk of second-trimester fetal loss associated with the use of D&C as abortion procedure (RR = 1.59), although the increase was not statistically significant.

The factors characterizing previous abortion were further examined in relation to other possible confounding variables. Table 4 shows the risks of fetal losses of the first two trimesters for second pregnancies of the women whose only previous pregnancy was terminated artificially according to the abortion method used. The highest frequency of first-trimester fetal loss was observed in the D&C/Suction procedure (χ^2_1 = 4.87, P < .05) with no evidence of heterogeneity among other procedures (χ^2_2 = 0.41, P > .05), whereas no significant association was detected for second-trimester loss. These observations are consistent with the result of the earlier analysis (Table 3).

Table 5 compares the frequencies of spontaneous fetal losses between the abortion cohort women whose last induced abortion was aided by laminaria for cervical dilatation and a control group in which no laminaria was employed. The risk of pregnancy losses tends to be greater for pregnancies subsequent to the induced abortion when no laminaria are used, although none of the associations proved to be significant.

Table 6 shows the relationship of completed gestation weeks with the risks of first two trimester spontaneous losses stratified by pregnancy order and abortion procedure. This subset of data limited to the abortion cohort corroborates the earlier finding of a significant association of gestation time with first-trimester spontaneous abortion (χ^2_1 = 9.36, P < .005) with about 55 per cent increase of the risk for early abortion (<9 weeks of gestation) over late abortion (≥9 weeks). No such association was detected for second-trimester loss in agreement with the earlier observation.

TABLE 4—First- and Second-Trimester Spontaneous Fetal Loss (SA) by Method of Abortion Procedure among Pregnancies Whose Only Prior Pregnancy Was Terminated by Induced Abortion

		D&C	Suction	D&C/S	Other	Total
First-Trimester	SA	11	34	41	12	98
	No SA	208	673	484	189	1554
	Total	219	707	525	201	1652
	p	.0502	.0481	.0781	.0597	.0593
Second-Trimester	SA	3	17	7	1	28
	No SA	216	690	518	200	1624
	Total	219	707	525	201	1652
	p	.0137	.0240	.0133	.0050	.0169

Table 7 compares spontaneous fetal losses between single and multiple induced abortion groups. The data also confirm the earlier findings of no significant differences between the two groups both for first- and second-trimester spontaneous losses.

Discussion

Our study has demonstrated no significant relationship between induced abortion and risk of spontaneous fetal loss in any trimester of subsequent pregnancies, although little information was available for third-trimester. The relative risks from the logistic regression analysis were 1.10, 0.88, and 0.81 for fetal losses in the first-, second-, and third-trimester, respectively. The corresponding estimates of the relative risks from a large body of unmatched data** are 1.11, 0.97, and 0.66, indicating no systematic bias of the logistic regression analysis of the matched data. Our findings are consistent with Kline, *et al.*[5] and Daling and Emanuel,[6] while at variance with the results of others.[4,7,8]

Summarizing three major worldwide studies, Tietze[2] noted that two out of seven comparisons showed significant increases in mid-trimester fetal loss among nulliparous abortion women relative to the control women of gravidity one. One of these positive findings involved a group of women with two or more induced abortions in California[7] and the other study was carried out in an eastern European country.[4] These data represent situations distinct from that for the present study. However, the summary raises an interesting question as to the power of test detecting a specified difference. In order to examine this question, we calculated

**Chung CS, Steinhoff PG, Smith RG, Mi MP: Effects of induced abortion on subsequent reproductive function and pregnancy outcome. Final Report to National Institute of Child Health and Human Development, 1981. (In press, East-West Population Institute Monograph Series, Honolulu, HI: East-West Center, 1982.)

TABLE 5—First- and Second-Trimester Spontaneous Fetal Loss (SA) of Subsequent Pregnancies by Use of Laminaria with Data Classified by Pregnancy Order and Abortion Procedure

			No Laminaria		Laminaria	
	Pregnancy Order	Abortion Procedure	Total	Proportion of SA	Total	Proportion of SA
First-Trimester	2	D&C	195	.0513	24	.0417
		Suction	483	.0538	224	.0357
		D&C/Suction	346	.0838	179	.0670
		Other	155	.0710	46	.0217
	3+	D&C	270	.0630	20	.0500
		Suction	552	.0779	191	.0733
		D&C/Suction	511	.0724	188	.0957
		Other	81	.0617	54	.0556
		Total	2593	.0686	926	.0626
		χ^2_1 = 0.40 RR = 1.12 (0.75–1.49)				
Second-Trimester	2	D&C	195	.0154	24	0
		Suction	483	.0269	224	.0179
		D&C/Suction	346	.0145	179	.0112
		Other	155	0	46	.0217
	3+	D&C	270	.0519	20	.0500
		Suction	552	.0236	191	.0105
		D&C/Suction	511	.0235	188	.0266
		Other	81	.0123	54	.0370
		Total	2593	.0235	926	.0184
		χ^2_1 = 0.17 RR = 1.17 (0.44–1.90)				

the power of detecting a doubled risk (RR = 2) from our data using the conditional power function.[22] The power calculated from the overall matched data reached nearly 100 per cent indicating that in no way could we miss such a magnitude of the effect of induced abortion, if present in our data. Therefore, we conclude that if there were any effect, it must be very small.

It has been hypothesized that instrumental dilatation followed by curettage (D&C) leads to cervical incompetence resulting in higher risk of second-trimester fetal loss.[4-7] Our data provide no convincing support to the hypothesis. The D&C procedure produced no significant increase in the risk of mid-trimester spontaneous abortion when compared with the control or other types of abortion procedure within the abortion cohort women. Furthermore, the use of laminaria at the time of prior induced abortion did not reduce the risk of mid-trimester spontaneous loss substantially. Nevertheless, the estimated relative risk was in the direction expected from

TABLE 6—First- and Second-Trimester Spontaneous Fetal Loss (SA) of Subsequent Pregnancies by Gestation Weeks at Previous Induced Abortion with Data Classified by Pregnancy Order and Abortion Procedure

			< 9 Weeks		≥ 9 Weeks	
	Pregnancy Order	Abortion Procedure	Total	Proportion of SA	Total	Proportion of SA
First-Trimester	2	D&C	98	.0612	121	.0413
		Suction	323	.0619	385	.0364
		D&C/Suction	238	.0840	287	.0732
	3+	D&C	140	.0429	150	.0800
		Suction	341	.1085	401	.0499
		D&C/Suction	317	.1009	381	.0604
		Total	1457	.0830	1725	.0551
		χ^2_1 = 9.36 RR = 1.55 (1.10–2.00)				
Second-Trimester	2	D&C	98	0	121	.0248
		Suction	323	.0341	385	.0156
		D&C/Suction	238	0	287	.0244
	3+	D&C	140	.0571	150	.0467
		Suction	341	.0293	401	.0125
		D&C/Suction	317	.0095	381	.0367
		Total	1457	.0220	1725	.0243
		χ^2_1 = 0.15 RR = 0.89 (0.37–1.40)				

TABLE 7—First- and Second-Trimester Spontaneous Fetal Loss (SA) by Number of Previous Induced Abortions with Data Classified by Abortion Procedure

		Two or More Previous Abortions		One Previous Abortion	
	Abortion Procedure	Total	Proportion of SA	Total	Proportion of SA
First-Trimester	D&C	43	.0698	244	.0615
	Suction	124	.0726	602	.0764
	D&C/Suction	170	.0647	506	.0850
	Other	37	.0811	97	.0515
	Total	374	.0695	1449	.0752
	χ^2_1 = 0.09 RR = 0.91 (0.50–1.32)				
Second-Trimester	D&C	43	.0465	244	.0533
	Suction	124	.0242	602	.0199
	D&C/Suction	170	.0176	506	.0257
	Other	37	.0270	97	.0206
	Total	374	.0241	1449	.0276
	χ^2_1 = 0 RR = 0.91 (0.21–1.61)				

the hypothesis: 1.59 for the D&C procedure compared with the control pregnancies with no prior induced abortion.

First-trimester spontaneous loss needs further elaboration because of its relatively higher relative risk and observed significant association with abortion procedure and gestation time of the prior induced abortion. The 10 per cent increase in the risk is admittedly small and can be dismissed as insignificant. However, there is a serious problem associated with early spontaneous abortion as a sequela of induced abortion in our study and other previous studies. The problem is related to competition between spontaneous fetal loss and induced abortion among women who are determined not to carry the pregnancy to term (unwanted pregnancies). Such pregnancies must result in either spontaneous abortion before an intended termination or induced abortion. When the outcome is spontaneous abortion, it is included as an observation in the sample whether the study is a case-control or cohort design, whereas the pregnancy is excluded from the sample if terminated as an induced abortion. This problem need not complicate a comparison for rates of spontaneous loss in a cohort study if the exposure and control groups have a comparable proportion of such women. However, it is known that the proportion of unwanted pregnancies is higher among women with prior induced abortion.[2,23] This tends to increase the rate of spontaneous abortion in the abortion cohort. Using the knowledge that the "competition" between spontaneous and induced abortion reduces the spontaneous abortion rate to about half of the level without such "competition",[24] we can derive expressions of unbiased frequency of spontaneous abortion in the absence of adverse effect of prior induced abortion as

$$s'_c = \frac{s(1 + p_0)}{2p_0 + s(1 - p_0)} \text{ for the control group and}$$

$$s'_a = \frac{s(1 + p_1)}{2p_1 + s(1 - p_1)} \text{ for the abortion cohort,}$$

where s is the general rate of spontaneous abortion, p_0 is the proportion of *wanted* pregnancies in the control, and p_1 is the proportion of *wanted* pregnancies in the abortion cohort. Wanted pregnancy is the complement of unwanted pregnancy. Then the relative risk (odds ratio) under either cohort or case-control design can be expressed as $(p_0 + p_0p_1)/(p_1 + p_0p_1)$ as discussed briefly in an earlier communication.[25]

Unfortunately, no reliable data on p_0 and p_1 are available at present. However, we could make rough estimates of these parameters using the existing data in Hawaii.[23,26] These are .80 and .55 for p_0 and p_1, respectively, and substituting these values into the formula leads to a relative risk of 1.25 for first-trimester spontaneous abortion even in the absence of any adverse effect of induced abortion. The value is larger than our overall estimate of the relative risk (1.10) and smaller than the maximum estimate of 1.29 (Table 2). Therefore, we conclude that the small amount of excess risk in first-trimester spontaneous abortion observed for the abortion cohort women could be accounted easily by the sampling problem.

Smoking and alcohol consumption are known to be associated with an increase in spontaneous abortion. Unfortunately, no direct information is available on these confounders in our samples. But interview data on small samples of the abortion and control groups showed no significant differences between them in their habits of smoking and alcohol consumption.***

There is a question as to whether our sample is representative of the original abortion cohort women. Our ancillary study*** showed that there was no major difference in outmigration rates between a sample of the abortion cohort and a control sample; the maximum estimates of outmigration rates were 23.3 per cent and 19.4 per cent for the respective samples. Furthermore, it is interesting to observe that demographic characteristics of those cohort women with one or more subsequent pregnancies were more similar to the general population than the original cohort.*** There-

***See Chung, et al, footnoted earlier.

fore, we have no reason to believe that outmigration would have distorted the results of our analysis.

We have observed some increase in the risk of first-trimester spontaneous abortion in association with the D&C/Suction procedure and early gestation time of the prior induced abortion. The fact that both of those antecedent factors are related to early gestation period of the prior induced abortion may have some significance, but a physiological basis, if any, for the observation is not clear. In any event, the overall data suggest that the general adverse effects of these factors must be too small to be of any major consequence.

Harlap, *et al*,[7] found an increase in second-trimester spontaneous abortion among nulliparous women with prior induced abortion particularly among those women with multiple induced abortions in comparison with the control women. Levin, *et al*,[8] observed significant increases in the risk of both first- and second-trimester spontaneous pregnancy losses among women with multiple induced abortions. None of these studies adjusted for the bias in the estimates of the relative risk due to the difference in the proportions of wanted pregnancies between the study and control groups as discussed above. As pointed out elsewhere,[25] overestimation of the relative risk becomes more serious for repeat aborter women because the probability of unwanted pregnancy increases with number of induced abortions.[2] Thus it is likely that at least part of the increased risks of spontaneous pregnancy loss observed by these investigators may be explained by the bias.

The present paper has presented a small segment of a larger study to investigate many aspects of long-term sequelae of induced abortion including prematurity, short gestation, ectopic pregnancy, pregnancy and labor complications, and congenital malformations in addition to fetal loss. Further study is in progress on the relationship between induced abortion and subsequent fetal loss.

REFERENCES

1. Sullivan E, Tietze C, Dryfoos JG: Legal abortion in the United States, 1975–1976. Fam Plann Persp 1977; 9:116–129.
2. Tietze C: Induced Abortion. A World Review, 1981. New York: The Population Council, 1981.
3. Cates W Jr: Late effects of induced abortion: hypothesis or knowledge? J Reprod Med 1979; 22:207–212.
4. WHO Task Force: Gestation, birth-weight, and spontaneous abortion in pregnancy after induced abortion. Lancet 1979; 1:142–145.
5. Kline J, Stein Z, Susser M, *et al*: Induced abortion and spontaneous abortion: no connection? Am J Epidemiol 1978; 107:290–298.
6. Daling JR, Emanuel I: Induced abortion and subsequent outcome of pregnancy in a series of American women. N Engl J Med 1977; 297:1242–1245.
7. Harlap S, Shiono PH, Ramcharan S, *et al*: A prospective study of spontaneous fetal losses after induced abortions. N Engl J Med 1979; 301:677–681.
8. Levin AA, Schoenbaum SC, Monson RR, *et al*: Association of induced abortion with subsequent pregnancy loss. JAMA 1980; 243:2495–2499.
9. Smith RG, Steinhoff PG, Diamond M, *et al*: Abortion in Hawaii: the first 124 days. Am J Public Health 1971; 61:530–542.
10. Steinhoff PG, Smith RG, Diamond M, *et al*: The Hawaii pregnancy, birth control and abortion study: social-psychological aspects. *In:* Conference Proceedings, Psychological Measurement in the Study of Population Problems. Institute of Personality Assessment and Research. University of California, Berkeley, 1972, 33–40.
11. Diamond M, Palmore JA, Smith RG, *et al*: Abortion in Hawaii. Fam Plann Persp 1973; 5:54–60.
12. Steinhoff PG, Palmore JA, Smith RG, *et al*: Pregnancy planning in Hawaii. Fam Plann Persp 1975; 7:138–142.
13. Smith RG, Steinhoff PG, Palmore JA, *et al*: Method of payment—relation to abortion complications. Health and Social Work 1976; 1:5–28.
14. Smith RG, Palmore JA, Steinhoff PG: The potential reduction of medical complications from induced abortion. Intl J Gynecol Obstet 1978; 15:337–346.
15. Holford TR, White C, Kelsey JL: Multivariate analysis for case-control studies. Am J Epidemiol 1978; 107:245–256.
16. Breslow NE, Day NE, Halvorsen KT, *et al*: Estimation of multiple relative risk functions in matched case-control studies. Am J Epidemiol 1978; 108:299–307
17. Rubin DB: The use of matched sampling and regression adjustment to remove bias in observational studies. Biometrics 1973; 29:185–203.
18. Truett J, Cornfield J, Kannel W: A multivariate analysis of the risk of coronary heart disease in Framingham. J Chronic Dis 1967; 20:511–524.
19. Miettinen OS: Stratification by multivariate confounder score. Am J Epidemiol 1976; 104:609–620.
20. Mantel N, Haenszel W: Statistical aspects of the analysis of data from retrospective studies of disease. J Natl Cancer Inst 1959; 22:719–748.
21. Fleiss JL: Statistical Methods for Rates and Proportions. New York: John Wiley & Sons, 1973.
22. Miettinen OS: The matched pairs design in the case of all-or-none responses. Biometrics 1968; 24:339–352.
23. Steinhoff PG, Smith RG, Palmore JA, *et al*: Women who obtain repeat abortions: a study based on record linkage. Fam Plann Persp 1979; 11:30–38.
24. Potter RG, Ford K, Moots B: Competition between spontaneous and induced abortion. Demography 1975; 12:129–141.
25. Chung CS: Induced abortion and subsequent pregnancy loss. (Letter to the Editor) JAMA 1981; 245:1119.
26. Hawaii State Department of Health: Statistical Report 1971. Department of Health, State of Hawaii, Honolulu, 1972.

ACKNOWLEDGMENTS

The authors are most appreciative for the cooperation of the Research and Statistics Office, Hawaii State Department of Health. We also sincerely thank all of the participating hospitals for making their records available for review for the present study. These are: Kapiolani, Kaiser, Queen's, Tripler, Castle Memorial, Kuakini, Straub, Wahiawa, Pearl Ridge, Kahuku Community, Hilo, Maui Memorial, Wilcox Memorial, Kona, Kauai Veterans Memorial, and Molokai Hospitals.

This work was supported in part by the National Institute of Child Health and Human Development (N01-HD-62801). An earlier version of the work was presented at the APHA Annual Meeting in Detroit, MI, 1980.

Document #14

TEENAGE PREGNANCY: THE PROBLEM THAT HASN'T GONE AWAY

Introduction

In 1976, The Alan Guttmacher Institute published *11 Million Teenagers*. It was primarily a statistical compilation in chart form of what was then known about adolescent sexuality, contraceptive use, pregnancy, childbirth, abortion and the health and social consequences of teenage childbearing. The chartbook specified services available to prevent adolescent births and to help pregnant teenagers and teenage parents to cope with the serious problems that they faced. More than 220,000 copies of *11 Million Teenagers* were sold and distributed.

The widespread popularity of *11 Million Teenagers* was in large measure due to growing public awareness that teenage sexual activity and pregnancy are not the special problems of any one economic, ethnic or social group, but affect young people from all regions of the country, from the cities and the farms, and from families of all socioeconomic levels, racial groups and religious denominations.

Most people agreed with the major recommendations in *11 Million Teenagers*—to prevent teenage pregnancy through realistic sex education programs and birth control services, to provide pregnant teenagers with an informed choice of maternity or abortion services, and to give pregnant teens, and teenage parents and their children, the health and social services and financial support that they need. Some, however, expressed concern that increasing the availability of sex education and birth control lowered moral standards and

encouraged sexual activity among young people, resulting in increased recourse to abortion. Others felt that there had not been sufficient emphasis on the social and behavioral factors involved in teenage pregnancy. The solution of the problem, they maintained, required fundamental changes in family relationships and values to which sex education or the increased availability of medical services such as contraception could contribute little. Still others noted that since the teenage birthrate was in fact declining, the problem was on its way to resolution.

The adolescent birthrate, it is true, has been going down, but the *pregnancy rate* has continued to increase. In 1974, the year referred to in *11 Million Teenagers*, there were one million adolescent pregnancies. By 1978, the year referred to in this publication, that number had increased by 100,000. More than one in 10 teenagers gets pregnant each year, and the proportion is rising. If patterns do not change, four in 10 young women will get pregnant at least once while still in their teens. Despite the declining teenage birthrate, there are 1.3 million children now living with teenage mothers, about half of whom are unmarried. An additional 1.6 million children under age five are living with mothers who were teenagers when they gave birth.

The increase in adolescent pregnancies stems largely from an increase in the number of teenagers who are sexually active. Rising and more consistent use of contraception has not kept pace with this increase. Of course, if

more teenagers abstained from sexual activity, the pregnancy rate could be brought down without increased recourse to contraception. As we will show, however, it is the exceptional young man or woman who gets through the teen years without engaging in sexual intercourse. We live in a society in which marriage and childbearing are being delayed, in which cohabitation is more widespread and accepted and in which all the media glorify youth and sexuality. There is no evidence that in such a setting simply increasing teenagers' fear of pregnancy by barring them from contraceptive and abortion services would do much to decrease their sexual activity. Keeping birth control services and information from teenagers is a singularly cruel as well as ineffective punishment to inflict on young people for responding to messages that many adults may deplore, but appear unable to change. Too many teenagers, far from being encouraged by the availability of birth control, experiment with sex for many months before ever using contraceptives; many, in the meanwhile, become pregnant.

It is a safe assumption that American young people have never embodied the ideal of premarital chastity, even in the days when marriage occured at much younger ages. Premarital pregnancy, out-of-wedlock childbirth and forced marriages of pregnant teenagers have always been common. What is new and probably responsible for increasing public concern about the problem is its increased visibility: The sight of pregnant teenagers is no longer uncommon in school classrooms (previously, a girl was automatically expelled from school if she became pregnant); surveys of teenage sexuality, contraceptive use, pregnancy, abortion and childbirth are widely publicized in the media; fewer teenagers marry to legitimate out-of-wedlock pregnancies, more often choosing either to exercise their new option of legal abortion or to bear and keep their child outside of marriage.

Facing the Facts

This new publication about teenage pregnancy is more comprehensive and detailed than its predecessor. It benefits from the considerable research undertaken in the 1970s. Although this new knowledge has not made us confident that the problem of teenage pregnancy can be solved quickly or simply, we do believe that it can be solved. We know that very few teenagers—very few, certainly, of the great majority who are unmarried—want to get pregnant or to have babies while they are so young. Still fewer of their parents want them to do so. Nor is there any benefit to the society from adolescent childbearing. On the contrary, it is costly to the society both in direct expenditures for health and social services and in the loss of the economic contribution that teenage parents might have made if their educations and vocational choices had not been circumscribed by early childbearing. We know that many teenagers are making great efforts to prevent pregnancy, that more of them are using contraceptives and using them earlier and more consistently than ever before. Many are doing so successfully. Yet pregnancy rates among U.S. teenagers are increasing, and teenage birthrates, though declining, are still among the highest in the world. The decline in births is largely contingent on continued access to legal abortions. While some teenagers, especially those who are older and married, may have births that are wanted and welcomed, the majority of adolescent births, and the overwhelming majority of youthful pregnancies, are unintended. It must be emphasized that unwanted pregnancies, not just unintended births, have adverse consequences for teenagers. Means to prevent both need to be extended.

As we have said, solution of this problem is not simple or single-faceted. In the pages that follow, we attempt to assemble the facts in a way that will make reaching a reasoned solution more possible and less painful than it has been in the past.

SECTION 4

Adolescent Births

The number and rate of births declined during the 1970s for all teenagers except those under age 15. However, the decline has been less steep than that among women in their 20s. What is more, despite the decrease, the U.S. teenage birthrate is higher than those of all but a handful of developed countries—higher even than the birthrates in several developing countries.

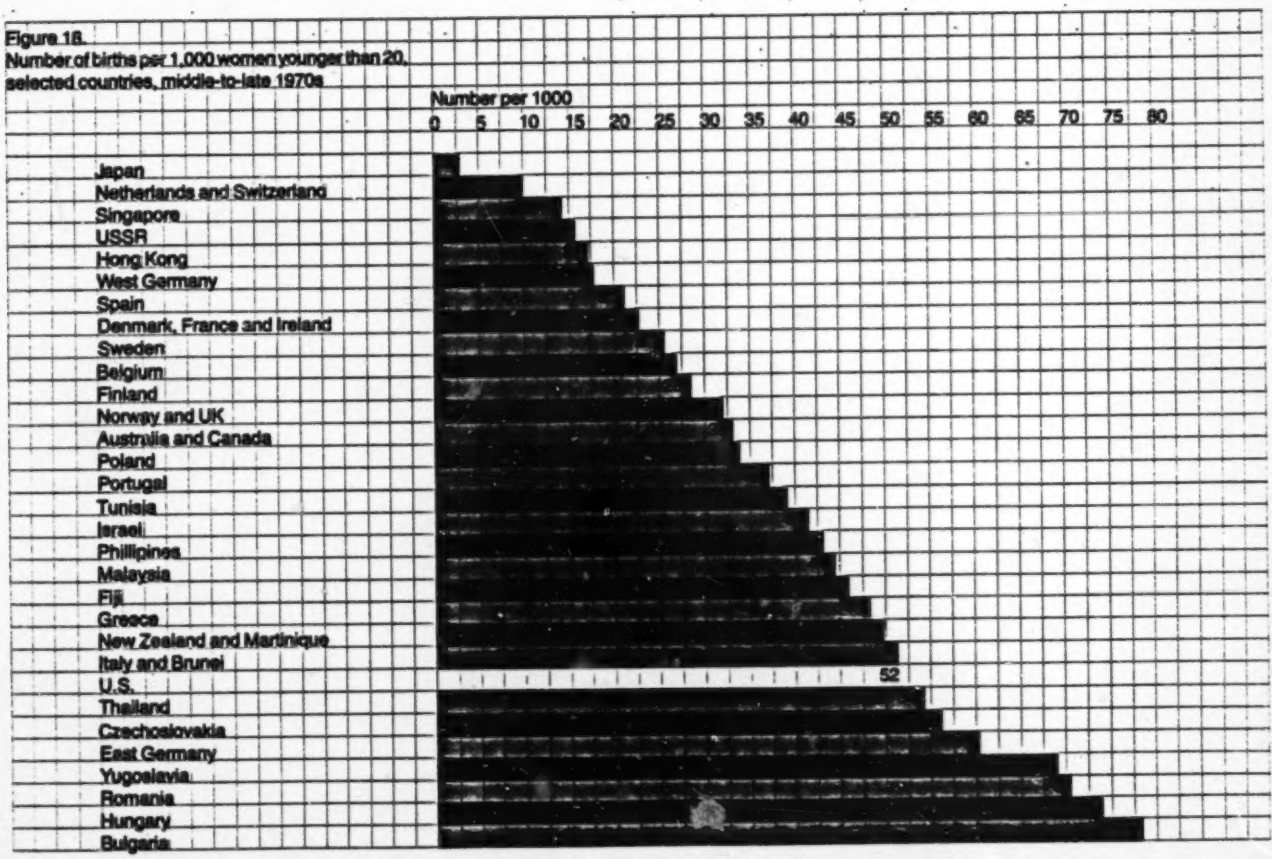
Although slowed because of the availability of legal abortion, the rise in the out-of-wedlock birthrate has continued among almost all groups of teenagers. The rise has been most steep among 15–17-year-old whites. The number of premaritally conceived births legitimated by marriage has been declining. Almost all unwed teenage mothers keep their children in the household with them.

All in all, 554,000 babies were born to teenagers in 1978, and 1.3 million small children were living with teenage mothers, half of whom were unmarried. An additional 1.6 million children under age five were living with mothers who were teenagers when they gave birth.

Teenage Birthrate in United States Is Among the World's Highest

About five percent of U.S. teenagers give birth each year. A higher proportion of adolescents become mothers in the United States than in any developed country, except for Czechoslovakia, East Germany, Yugoslavia, Romania, Hungary and Bulgaria. Japan's teenage birthrate is one-eighteenth as high; the Netherlands and Switzerland have rates just one-fifth as high as that of the United States. The U.S. rate is about three times higher than the Soviet Union's, and is about the same as that of Italy and Thailand. It is higher than the rate in such developing countries as the Philippines, Malaysia, Singapore and Tunisia.

Figure 18
Number of births per 1,000 women younger than 20, selected countries, middle-to-late 1970s

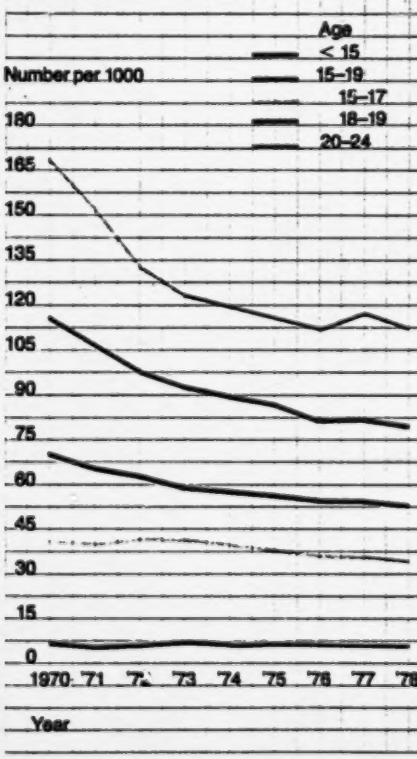


Teenage Birthrate Drops Much Less Sharply Than That of Women in their 20s

In 1978, three percent of 15–17-year-olds and eight percent of 18–19-year-olds gave birth. The U.S. teenage birthrate is relatively high, although it fell throughout the 1970s. It did not drop so steeply as the rate for women in their 20s, however. The younger the teenager, the smaller the birthrate decline: The rate for 20–24-year-olds fell by 33 percent between 1970 and 1978; for those aged 18–19, the decline was 29 percent; for 15–17-year-olds, it was 15 percent; and for girls under 15, there was no decline at all.

As might be expected, 78 percent of births to teenagers are first births. However, 18 percent are second births, and four percent are third or higher order births. The sooner a teenager gives birth after initiation of intercourse, the more likely she is to have subsequent births while still in her teens.

Figure 19.
Number of births per 1,000 women younger than 25, by age-group, 1970–1978



Teenage O.W. Birthrate Rising, But Increase Slowed by Abortion Use

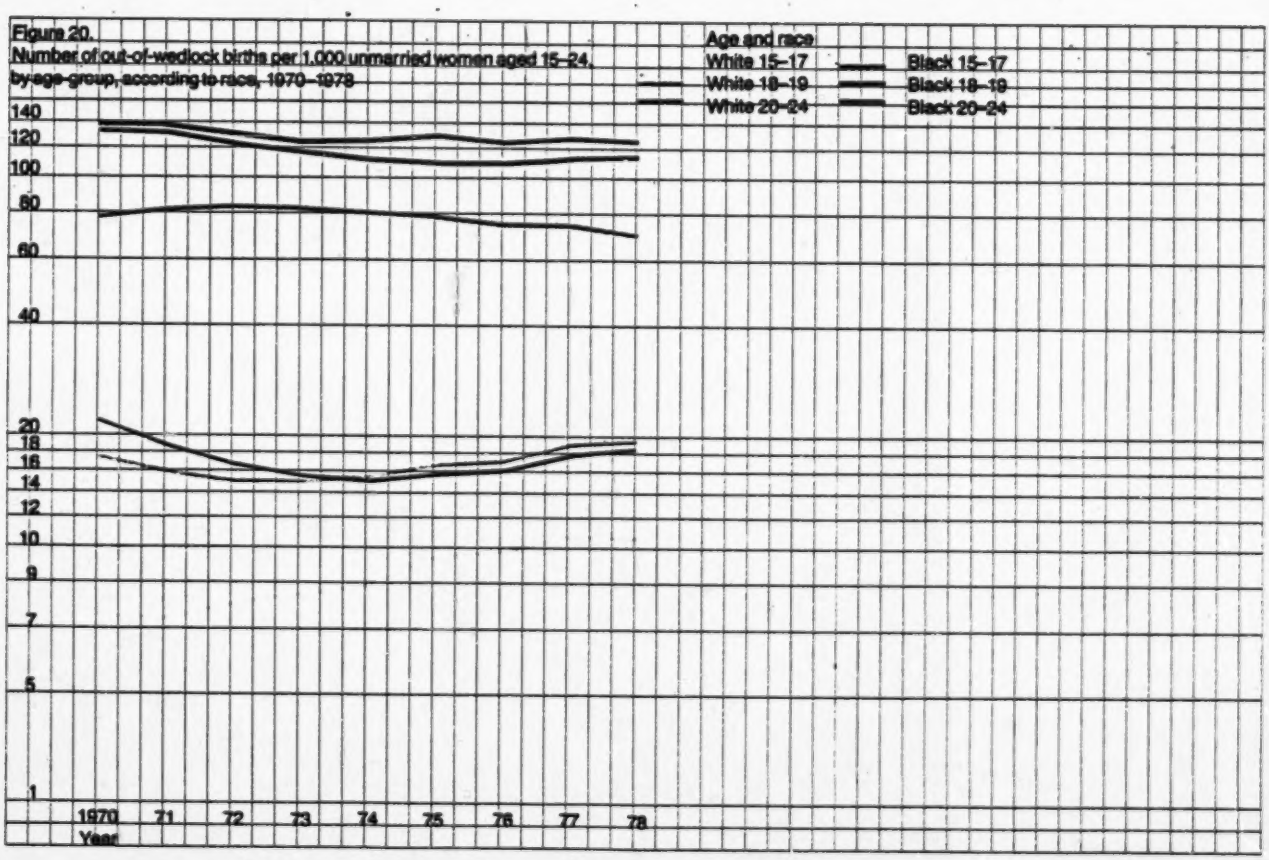
The rate of out-of-wedlock births to teenagers continued to rise over the 1970s, although at a much slower rate than it did in the 1960s (13 percent compared to 34 percent). Indeed, the liberalization of abortion laws in several large states in 1970, and abortion legalization nationwide in 1973, brought the historic increase in births to teenagers outside of marriage to a virtual halt in the first part of the decade; by the late 1970s, however, the rate again began to climb slowly, largely because fewer teenagers married to legitimate births.

Notably, the increase in the adolescent out-of-wedlock birthrate in the 1970s was confined to whites (a rise of 27 percent)—especially those aged 15–17, among whom there was a 40 percent rise. Rates among black teenagers actually declined in the 1970s by seven percent; among younger black teenagers, the decline was 10 percent, and it was continuous following the 1973 Supreme Court decisions legalizing abortion.

All in all, about 249,000 of the 544,000 out-of-wedlock births that occurred in 1978 were to women under age 20—about equally divided between 18–19-year-olds and those aged 17 and younger.

The out-of-wedlock birthrate among 20–24-year-olds declined more sharply than the teenage rate in the first half of the 1970s, but has been rising again almost as steeply since mid-decade.

Figure 20.
Number of out-of-wedlock births per 1,000 unmarried women aged 15–24, by age group, according to race, 1970–1978



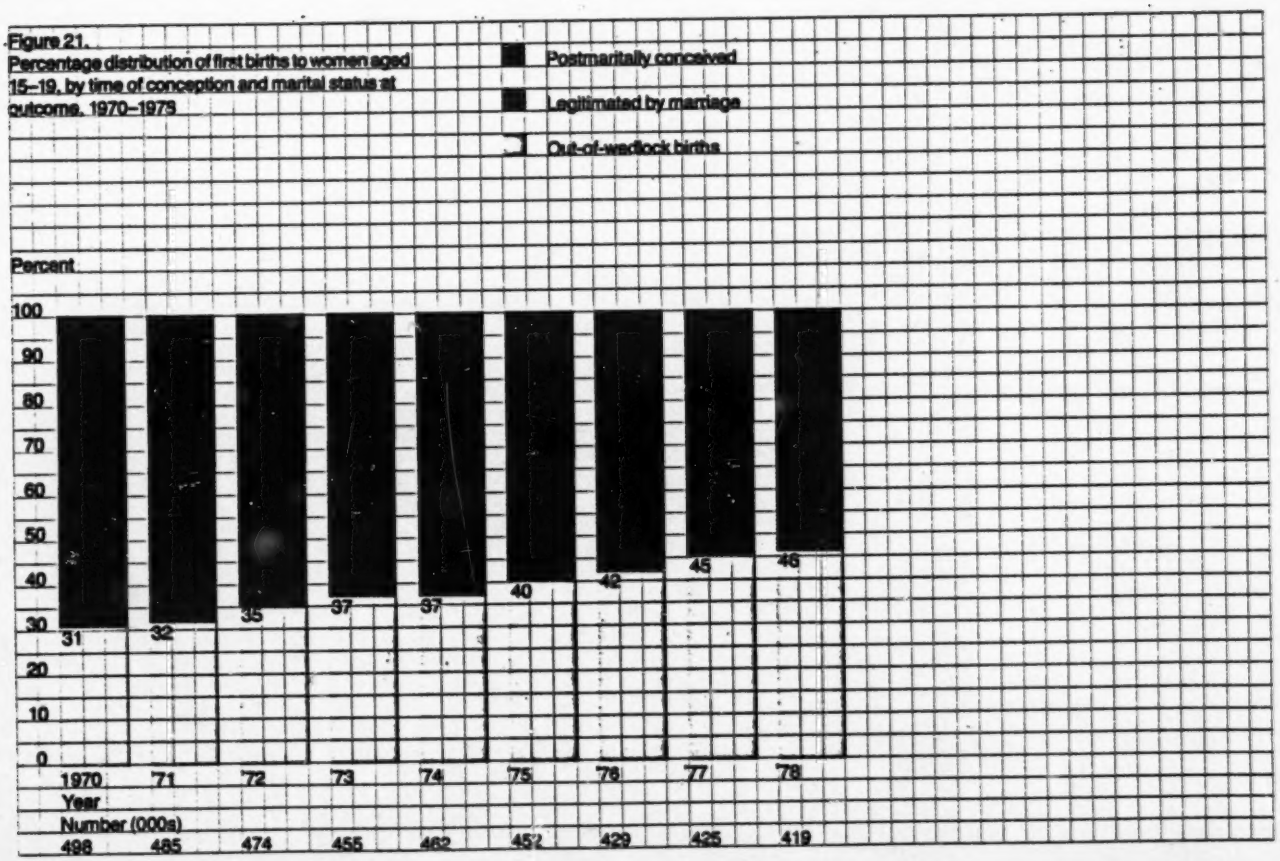
Teen Premarital Conceptions Rise; Fewer Legitimated by Marriage

While there was an increase in out-of-wedlock births among teenagers during the 1970s, there was a decline in the number of brides pregnant at marriage. There was an even sharper drop in the number of births conceived by teenagers following marriage. As a result, whereas 63 percent of first births to teenagers were the result of premarital conceptions in 1970, the proportion was 72 percent in 1978.

In 1970, 37 percent of first births to adolescents were the result of postmarital conceptions, 32 percent were from premarital conceptions delivered following marriage and 31 percent were delivered out of wedlock. By 1978, the picture had changed dramatically: Only 28 percent of first births had been conceived following marriage, 26 percent had been conceived premaritally but were delivered following marriage and 46 percent were out-of-wedlock births.

In 1978, as in 1970, close to half of all marital first births to teens were premaritally conceived.

Figure 21.
Percentage distribution of first births to women aged 15–19, by time of conception and marital status at outcome, 1970–1978



Only a Few Unwed Teen Mothers Give Up Children for Adoption or Care by Others

Although two-thirds of births to unmarried teenagers are unintended, unwed teenage mothers very rarely give up their babies for adoption or for care by friends or relatives. Ninety-six percent of unmarried teenage mothers—90 percent of white and virtually all of black mothers—keep their children with them (although in many cases, grandparents or other relatives help take care of the baby). In 1971, resort to adoption or care by others was more common: Eighty-seven percent of teen mothers kept their children—75 percent of white mothers and 94 percent of blacks. With legalization of abortion, many unwed teenagers choose to terminate unwanted pregnancies by abortion rather than to bear children that they would have to give up for adoption or for care by friends or relatives. If they do not have abortions, most keep their babies.

1.3 Million Children Now Living With 1.1 Million Teenage Mothers

Despite the decline in adolescent childbearing, there are about 1.3 million children now living with 1.1 million teenage mothers. More than half of these children are living with unmarried mothers. Two-thirds were born to mothers aged 17 or younger. There are an additional 1.6 million children under age five who were born to teenage mothers—1.2 million of them were born out of wedlock, and 635,000 were born to unwed mothers aged 17 or younger.

These figures give some idea of the magnitude of the problems involving teenage mothers and their children.

Figure 22
Percentage distribution of out-of-wedlock births resulting from first conceptions to women aged 15–19 in 1976, by disposition, according to race

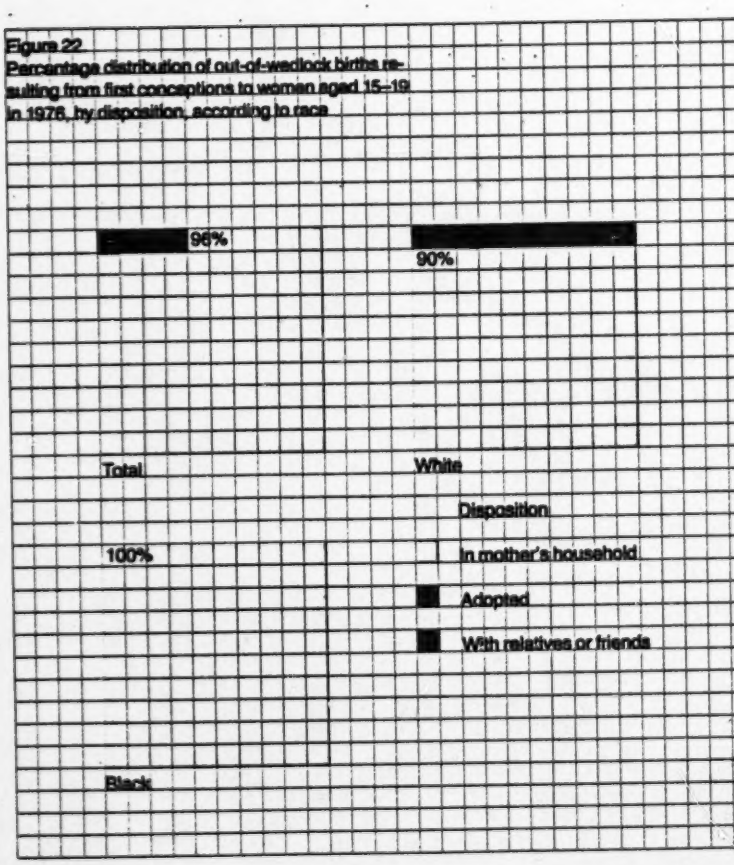
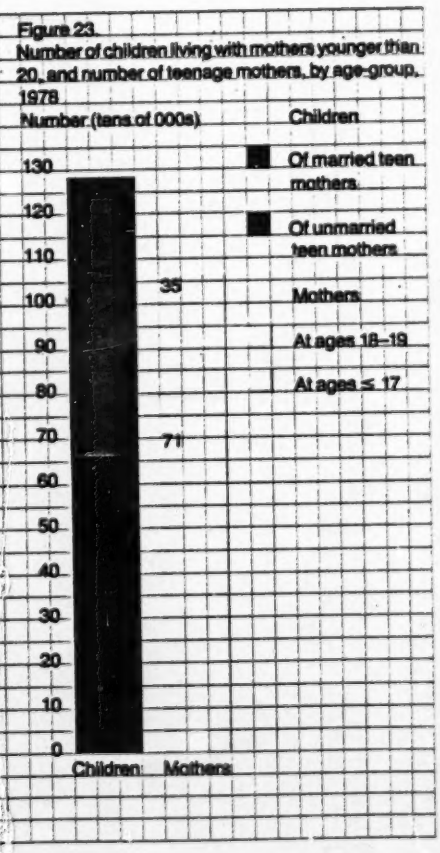


Figure 23
Number of children living with mothers younger than 20, and number of teenage mothers, by age-group, 1978



SECTION 5

Consequences of Teenage Childbearing

The health, social and economic consequences of teenage pregnancy are almost all adverse. Pregnancies that end in abortion or miscarriage are, at the least, upsetting and sometimes traumatic to the pregnant woman. They also involve some health risks to the teenager (although abortions before the 16th week of pregnancy are less dangerous than childbirth). Those pregnancies that result in births, however—most of which are unintended—have the most obvious negative consequences and are of most concern.

Babies born to teenage mothers are much more likely to die in the first year of life than those born to mothers over age 20. Maternal mortality and morbidity, and the risk of having a low-birth-weight infant, are also considerably greater among teenage mothers.

The most far-reaching consequence of teenage childbearing is the truncation of education among the young parents, and the resulting limitation of opportunities to gain skills needed to compete in society. Largely because of educational deficits, teenage parents are frequently unable to get decent jobs, and their family incomes tend to be much lower than those earned by other families.

The high probability that a teenage mother will bring up her child in a home with no father present is another reason her family income is so low. Even if they do marry, teenage parents are far more likely to become divorced or separated than are those who delay childbearing, and their babies are far more likely to spend a large part of their childhood in one-parent households. Alone, with small children, little education and few skills, it is small wonder that many teenage mothers find themselves on welfare or living below the officially designated poverty level. What income they have needs to be stretched to feed more young mouths, since teenage mothers have more births and more unintended births in the course of their reproductive lives than do those who delay childbearing until their 20s.

Living in poverty, lacking education and opportunity and being brought up in a one-parent home hurts the children of teenage parents, too. Such children are likely to have lower IQ and achievement scores than others, and are more likely to repeat school grades than other children. When they grow up, they are more likely than others to become teenage parents themselves.

Unwed teenage mothers are more likely to complete their education, get decent jobs and avoid dependence on welfare if they live with their parents than if they live alone.

Infant Death Risk Twice as High for Teen Mothers as for Mothers in Their 20s

Data from New York State for 1974–1978 indicate that babies born to teenage mothers are far more likely to die in the first year of life than those born to mothers over age 20. Their risk of death is nearly two times greater than that of babies born to mothers in their 20s, and is greater than that of infants born to mothers aged 40 or older—a high-risk age-group.

Maternal mortality also appears to be higher among teenage mothers, especially young adolescent mothers: In 1977–1978, the maternal death rate among mothers under age 15 was 18 per 100,000 live births—two and one-half times the rate among mothers aged 20–24 (7.1). Nonfatal maternal complications were considerably lower in 1975–1978 than in 1961–1969 for all age-groups, but were still higher for teenage mothers than for others: Teenage mothers were 15 percent more likely to suffer from toxemia, 92 percent more likely to have anemia and 23 percent more likely to suffer from complications attendant upon a premature birth than were mothers who gave birth at ages 20–24.

The risks are much greater for those who are poor and black, but differentials by age at birth still persist.

Mothers 15 and Younger 2 Times More Likely to Have Low-Birth-Weight Babies

Teenage mothers are far more likely than those who delay childbearing until their 20s to have babies that are premature or of low birth weight (less than 5.5 pounds). Low birth weight is a major cause of infant mortality, as well as a host of serious childhood illnesses, birth injuries and neurological defects, including mental retardation.

Improved prenatal care has reduced prematurity and low-birth-weight rates among all age-groups, but mothers aged 15 and younger are still two times more likely to have low-birth-weight babies than are those aged 20–24. Among all teenagers, the risk is about 39 percent higher. The risk declines with increasing age of the young mother, but even mothers aged 19 have rates 27 percent higher than those who wait to give birth until they are in their early 20s. Low-birth-weight rates among black babies continue to be much higher than those among whites whatever the age of the mother, in part because black women obtain prenatal care much later.

Figure 24.
Number of infant deaths per 1,000 live births, by age of mother, New York State, 1974–1978

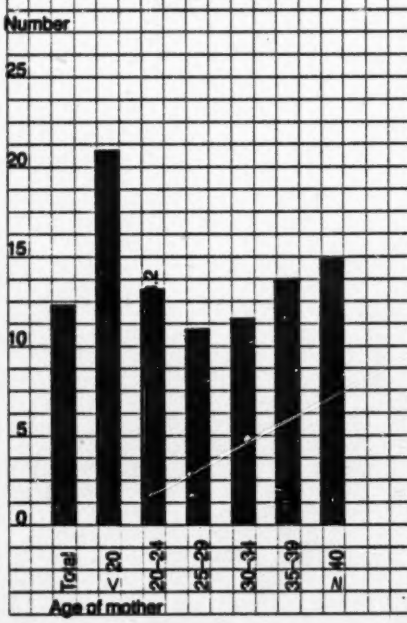
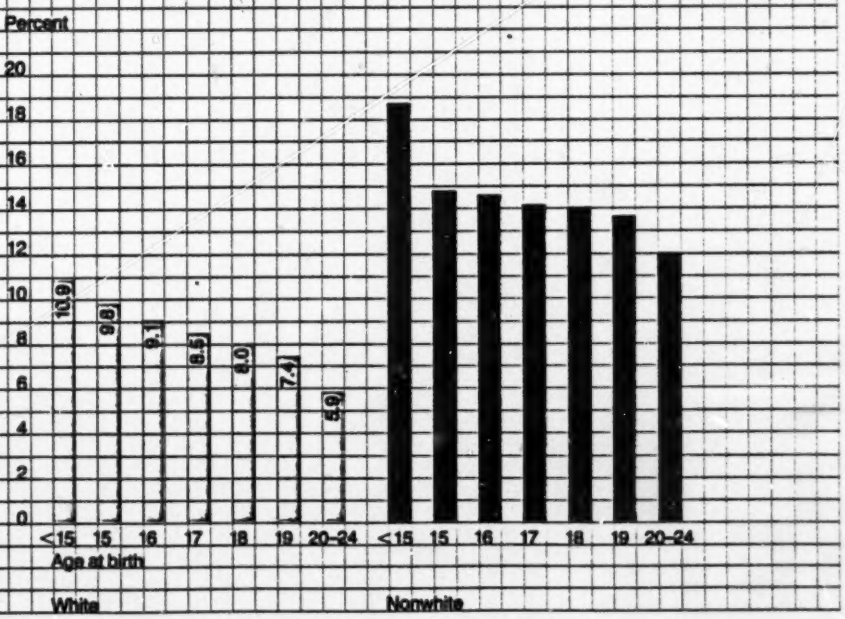


Figure 25.
Percentage of babies of low birth weight (less than 2,500 grams), by age of mother, according to race, 1978



Teen Childbearing Frustrates Educational Opportunities, Preparation for Careers

Many teenage parents finish high school; some even get to college. But the majority of them, especially of young teenage mothers, never obtain even a high school diploma.

The devastating effect of early childbearing on educational opportunity is not simply the result of poverty, low aptitude or lack of interest in learning. A national study matched samples of young people for race, socioeconomic status, academic aptitude and achievement and educational expectations at age 15. It found that among these matched samples, when reinterviewed at age 29, mothers who had given birth before they were 18 were only half as likely to have graduated from high school as those who postponed childbearing until after they turned 20.

For young fathers in the matched samples, the effect, as might be expected, was less dramatic, but still substantial: Those who became fathers before age 18 were two-fifths less likely to have graduated from high school than those who waited.

The net effect of childbearing at ages 18–19 on high school graduation is significant, but not nearly so great as childbearing at younger ages. It has a very large effect, however, on completing college. By age 29, women who delayed childbearing until their 20s were 4–5 times more likely to have completed college than those who became mothers in their teens. By age 29, young men who became fathers in their teens were only half as likely to have completed college as those who put off fatherhood until their early 20s.

Studies show that children of teenage parents also suffer educational and cognitive deficits: They tend to have lower IQ and achievement scores than the children of those who delayed childbearing, and are more likely to repeat at least one school grade.

Income of Young Teen Mothers Half That Of Those Who First Gave Birth in Their 20s

Teenage parents are more likely than those who delay childbearing to have low-status, low-paying jobs or to be unemployed. The mean family income in 1975 of white women who gave birth at or before age 16 was $7,550, about half of the $13,900 earned by families where the mother delayed birth until her middle-to-late 20s. The younger the mother at childbirth, the lower her annual family income.

Looked at in another way, 54 percent of 24-year-old women who had given birth at age 17 or younger were classified as being of low socioeconomic status, compared to 33 percent of those who had given birth between ages 21 and 23 and 15 percent of those still childless.

Poor education is one of the major factors keeping teenage mothers' incomes low. Another factor is the relatively high probability that teenage mothers will bring up their child in a home where there is no breadwinning father present.

Figure 26.
Percentages of mothers and fathers, in samples matched for race, socioeconomic status, academic aptitude, achievement and educational expectations at age 15, who received a high school diploma and completed college, by age of parent at birth of first child

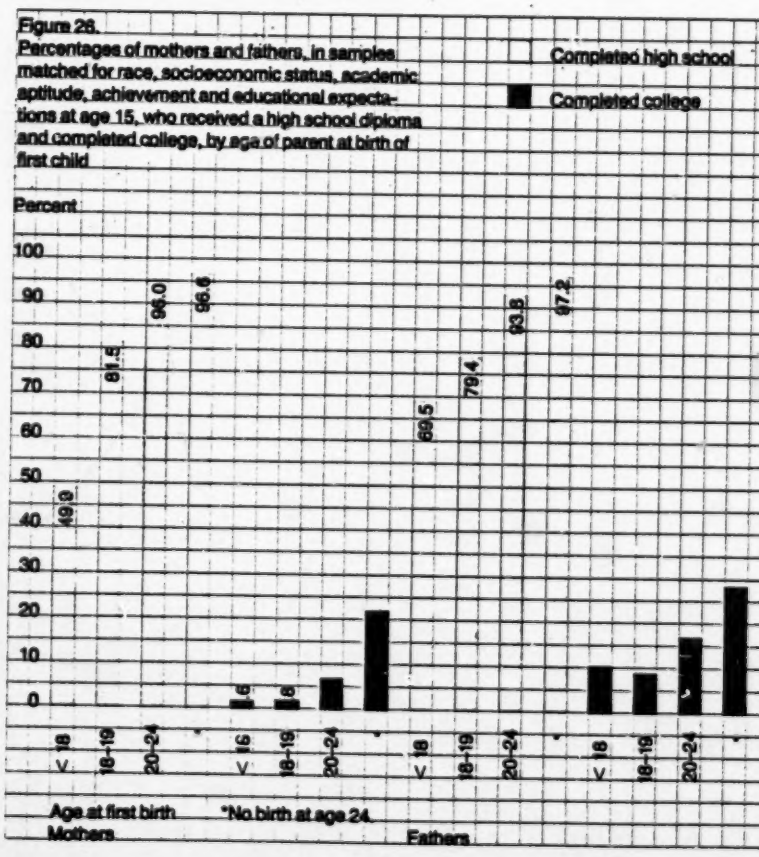
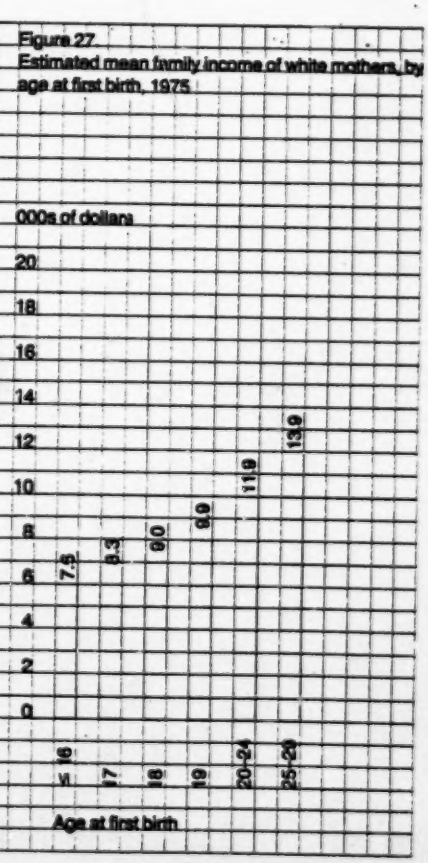


Figure 27.
Estimated mean family income of white mothers, by age at first birth, 1975



Marriage Disruption 3 Times More Likely For Young Teens Than Later Childbearers

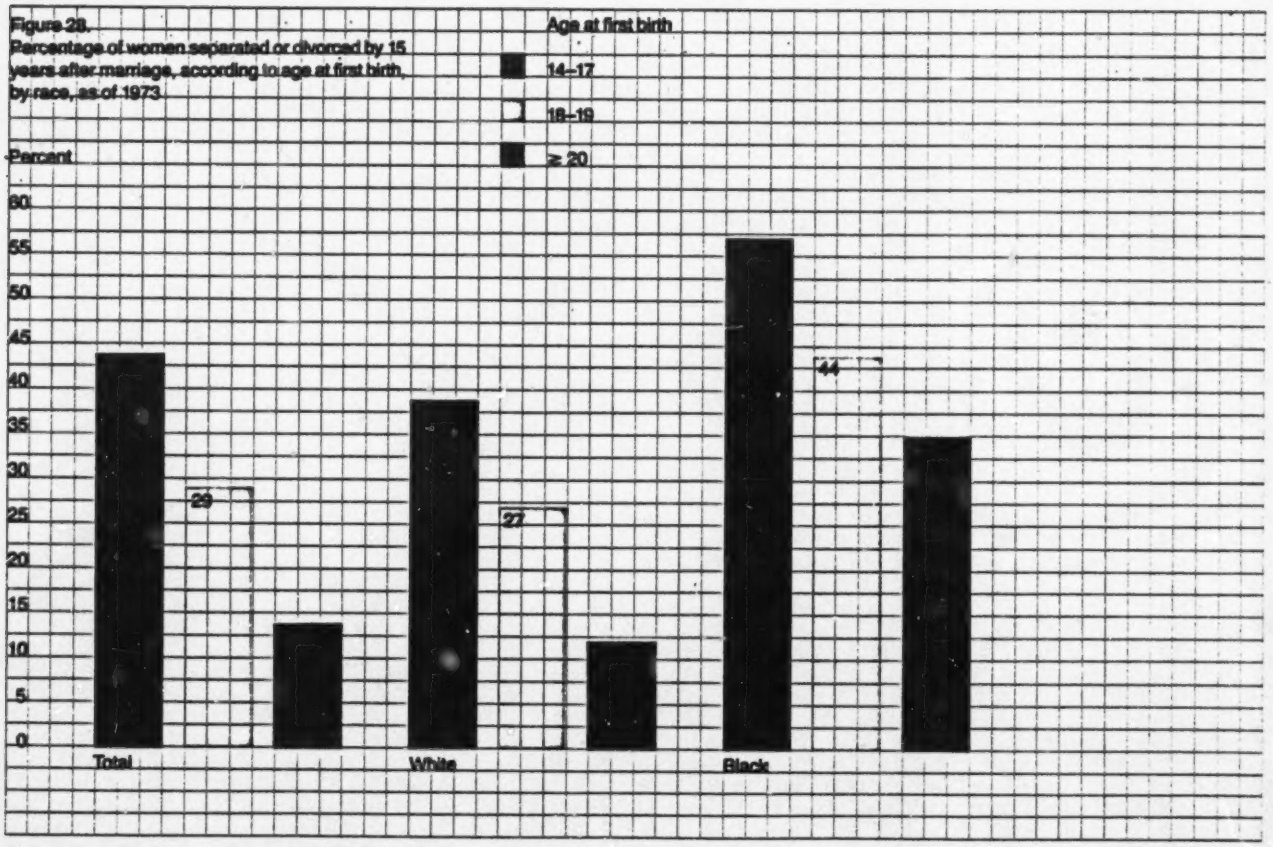
If they marry, teenage parents are far more likely to separate or divorce than couples who postpone childbearing until their 20s. The trend is evident among women of all races, but is more pronounced among whites than among blacks.

Forty-four percent of women who gave birth at ages 14–17 are separated or divorced within 15 years, three times the proportion among women who did not begin childbearing until age 20 or later. Marriage disruption is two times more likely among those who become parents at ages 18–19 than among those who wait until their 20s.

As a result of this pattern, by age eight, 70 percent of children first-born to women at age 17 or younger have spent part of their childhood in a single-parent household. This compares to 41 percent of the children first-born to women at ages 18–19, and about 25 percent of children first-born to women in their 20s.

Young mothers who do not live with the child's father are far less likely to receive child-support payments than are older mothers: More than one-quarter of all mothers who are not living with their child's father receive child-support payments, compared to only one in 10 such mothers aged 14–24. For the small number of young mothers who do receive financial help from the father, the support payments are generally small, averaging only $1,388 a year.

Figure 28.
Percentage of women separated or divorced by 15 years after marriage, according to age at first birth, by race, as of 1973



$4.7 Billion in AFDC Payments to Families Where Mother Gave Birth in Her Teens

Many teenage mothers with small children to take care of, few skills, little education and no husband in the home must become dependent on public welfare for support. In 1975, about half of the $9.4 billion invested in the federal Aid to Families with Dependent Children (AFDC) program went to families in which the woman had given birth as a teenager. Six out of 10 women in families receiving AFDC payments had given birth as teenagers, compared to just about one-third of women in families not receiving such payments.

About one-fourth of teenage mothers are currently receiving AFDC payments.

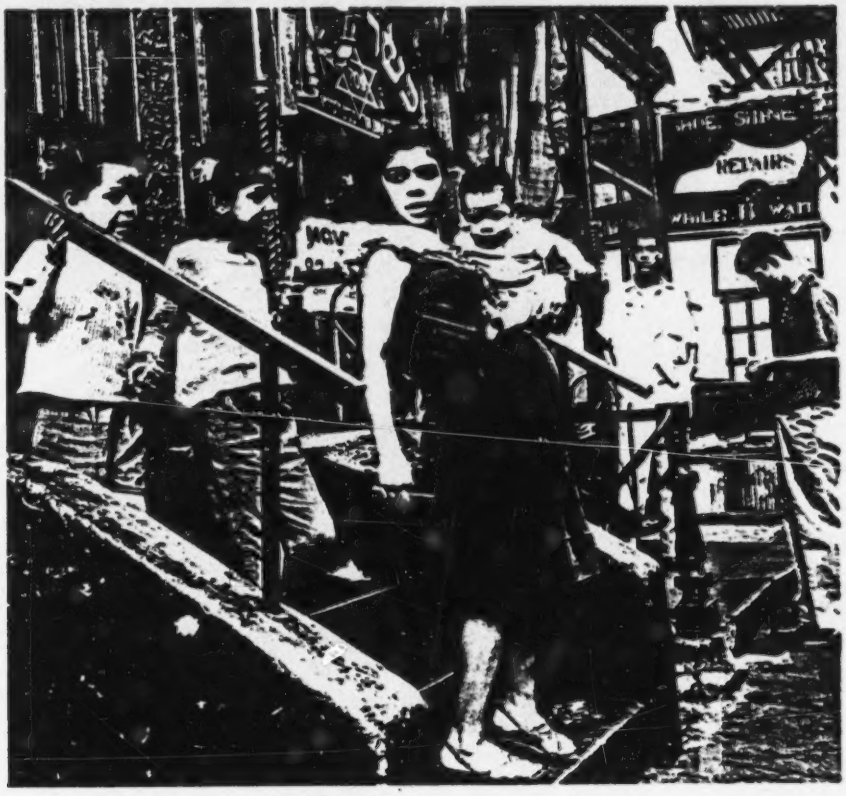
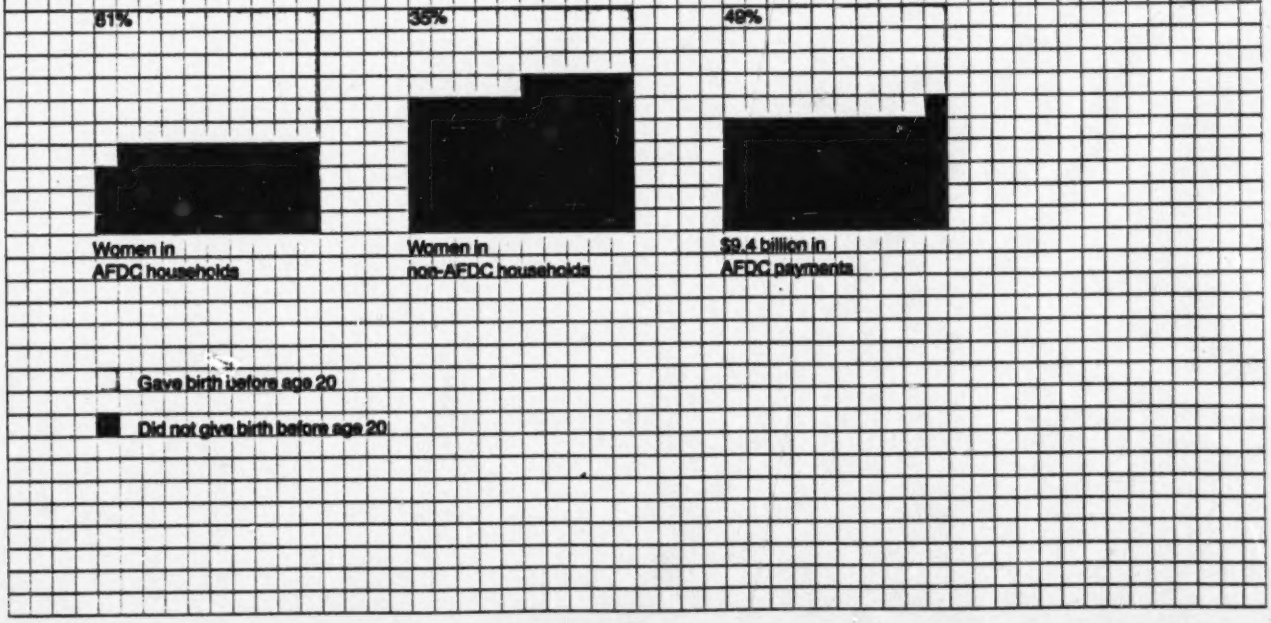


Figure 29.
Percentage distributions of women in AFDC households and non-AFDC households, by whether they gave birth before age 20, and percentage distribution of $9.4 billion in AFDC payments, by whether recipients gave birth before age 20, 1975

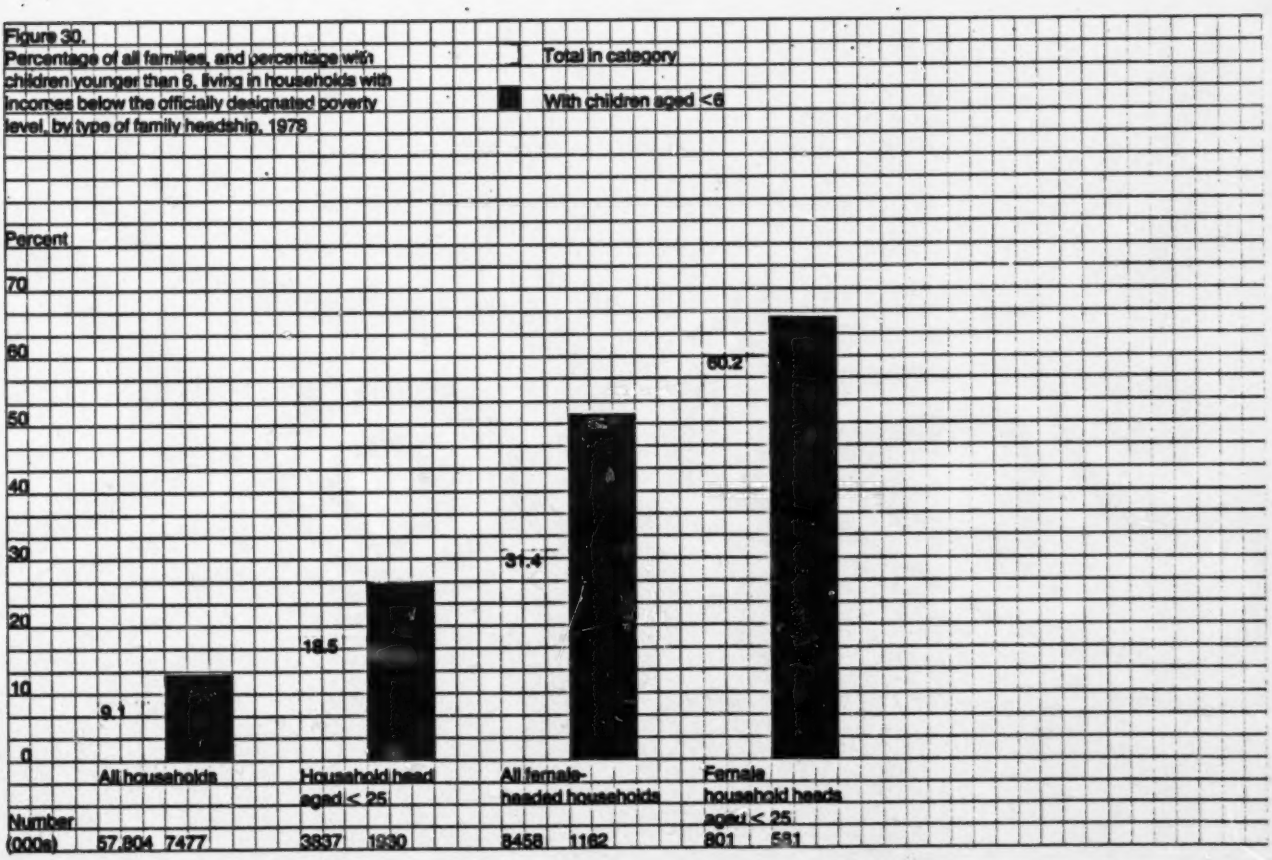


Families Headed by Young Mothers 7 Times as Likely as Others to Be Poor

There are nearly 600,000 families with children five years old or younger headed by mothers aged 14–25. Two-thirds of these families are living below the officially designated poverty level ($6,682 for a nonfarm family of four). This is five times the proportion of all families with such young children living in poverty (13 percent), and seven times the proportion of all families living in poverty (9 percent).

Indeed, the median annual income of families headed by women under age 25 is $3,953—well below the official poverty level. Such families have incomes only about one-fifth as high as that of all families and three-tenths as high as that of young husband-wife families.

Figure 30.
Percentage of all families, and percentage with children younger than 6, living in households with incomes below the officially designated poverty level, by type of family headship, 1978



Young Teenage Mothers Have 50% More Births Than Later Childbearers

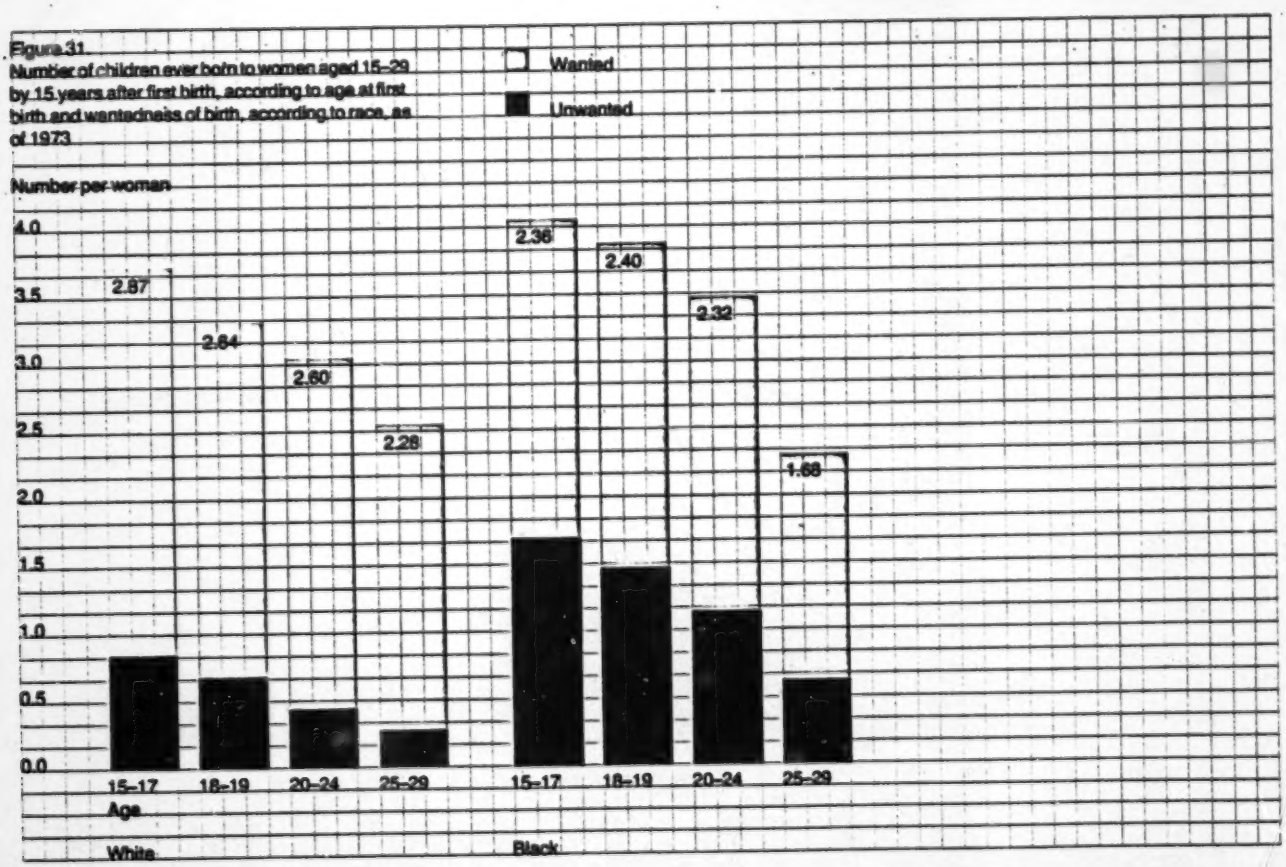
Women who gave birth as teenagers not only have lower incomes than other women, but generally have to stretch that income to feed more mouths.

White women who first gave birth at ages 15–17 have about 46 percent more children than those who waited to become parents until their middle-to-late 20s; those who gave birth at ages 18–19 have 30 percent more children.

Survey research also provides information about birth intentions. The number and proportion of all births that are unintended rise sharply with earlier age at childbearing—21–23 percent of all births to white women who became mothers as teenagers were unintended, compared to 10 percent of births to those who waited until their middle-to-late 20s.

The average mother who gave birth at ages 15–17 has had one unintended birth, while only one in four women who started childbearing at ages 25–29 has had an unintended birth. The same trends are seen among blacks as among whites, but the effects of early childbearing for total and unintended births are even more extensive for black women.

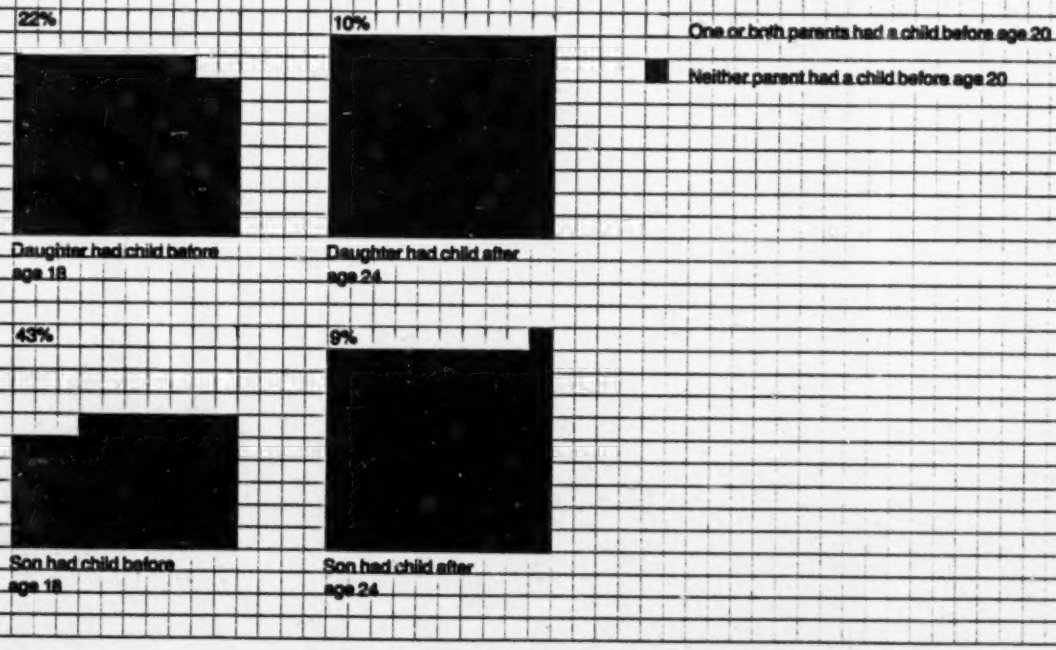
Figure 31
Number of children ever born to women aged 15–29 by 15 years after first birth, according to age at first birth and wantedness of birth, according to race, as of 1973



Teen Mothers More Likely to Have Had A Teen Parent Than Later Childbearers

Of those women who became mothers at age 17 or younger, 22 percent had at least one parent who had had a child as a teenager—more than two times the proportion of women who delay childbearing to age 25 or later. Forty-three percent of comparable young fathers had a teenage parent—nearly five times the proportion of young men who did not become parents before age 25. All in all, about 20 percent of teenage fathers and 15 percent of teenage mothers had a teenage parent—about half again the proportion of those who delayed parenthood until after age 20 (14 percent and 10 percent, respectively). The younger the mother at birth, the more likely she is to have had a teenage parent. In one study, 82 percent of girls who became mothers at age 15 or younger had mothers who first gave birth as teenagers.

Figure 32
Percentage distributions of women and men who first had a child before age 18 and who delayed childbearing to age 25 or older, according to age at which their parents first gave birth



SECTION 8

Abortion Services

For many teenagers who find themselves confronted with an unplanned pregnancy, abortion is preferable to an unintended birth. The number of abortions obtained by adolescents nearly doubled between 1973 and 1978. Poor and black teenagers were less likely to terminate an unwanted pregnancy by abortion than those who were white and more affluent. However, because unwanted pregnancies were much more prevalent among poor and black teens, their abortion rates were little different from those of the other groups. Increased availability of abortion has not resulted in a relaxation of contraceptive use among teenagers, but has been associated with an improvement in their contraceptive practice.

Because of distance, cost, parental consent requirements, lack of familiarity with the medical system, menstrual irregularities and psychological factors, teenagers are much more likely than older women to delay abortion to the later, more dangerous weeks of pregnancy.

Most U.S. counties have no abortion facilities, and cost has been an increasing obstacle to service since the Supreme Court declared the Hyde Amendment constitutional. (Most young people are dependent on their parents, partners or public funds to pay for their abortions.) Parental consent is required by two-fifths of abortion facilities for at least some teenage patients. Three in 10 teenagers estimated to want and need abortion services in 1978 were unable to obtain them, and their pregnancies resulted in unintended births. As is the case with contraception, most young teenage patients tell their parents about their decision to have an abortion, but a significant minority would not come to the facility if parental notification were required. Thousands of illegal or self-induced abortions and additional unintended births could be expected to result.

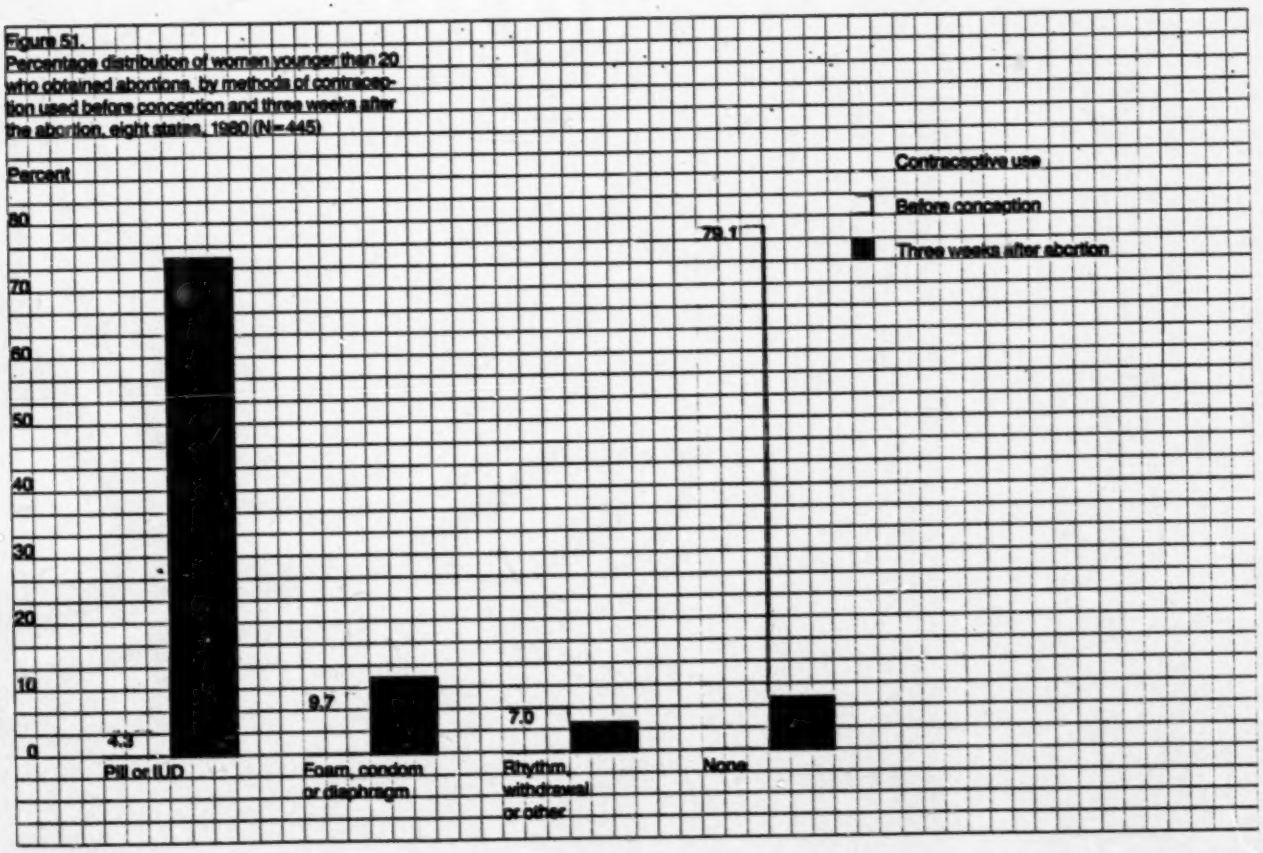
Abortion Availability Leads to Better, Not Poorer, Contraceptive Use by Teens

The availability of legal abortion has not resulted in a relaxation of contraceptive vigilance among teenagers. As we noted earlier, the pregnancy rate among sexually active adolescents has declined by 22 percent since abortion was legalized (see Figure 12) and contraceptive use has increased by 35 percent (see Figure 4).

Indeed, there is strong evidence that teenagers practice contraception much more effectively after they have had abortions than they had before. One study involving nine clinics in eight states showed that eight in ten teenagers coming to a clinic to obtain abortions had used no method of contraception prior to the procedure, and only four percent had used the IUD or the pill. Three weeks following the abortion, only nine percent were not using any method and 83 percent were using the pill or IUD.

The Johns Hopkins National Survey of Young Women found that teenagers whose first pregnancy ended in abortion were only half as likely to become pregnant a second time within the following year than those whose first pregnancy resulted in a live birth (see Figure 15).

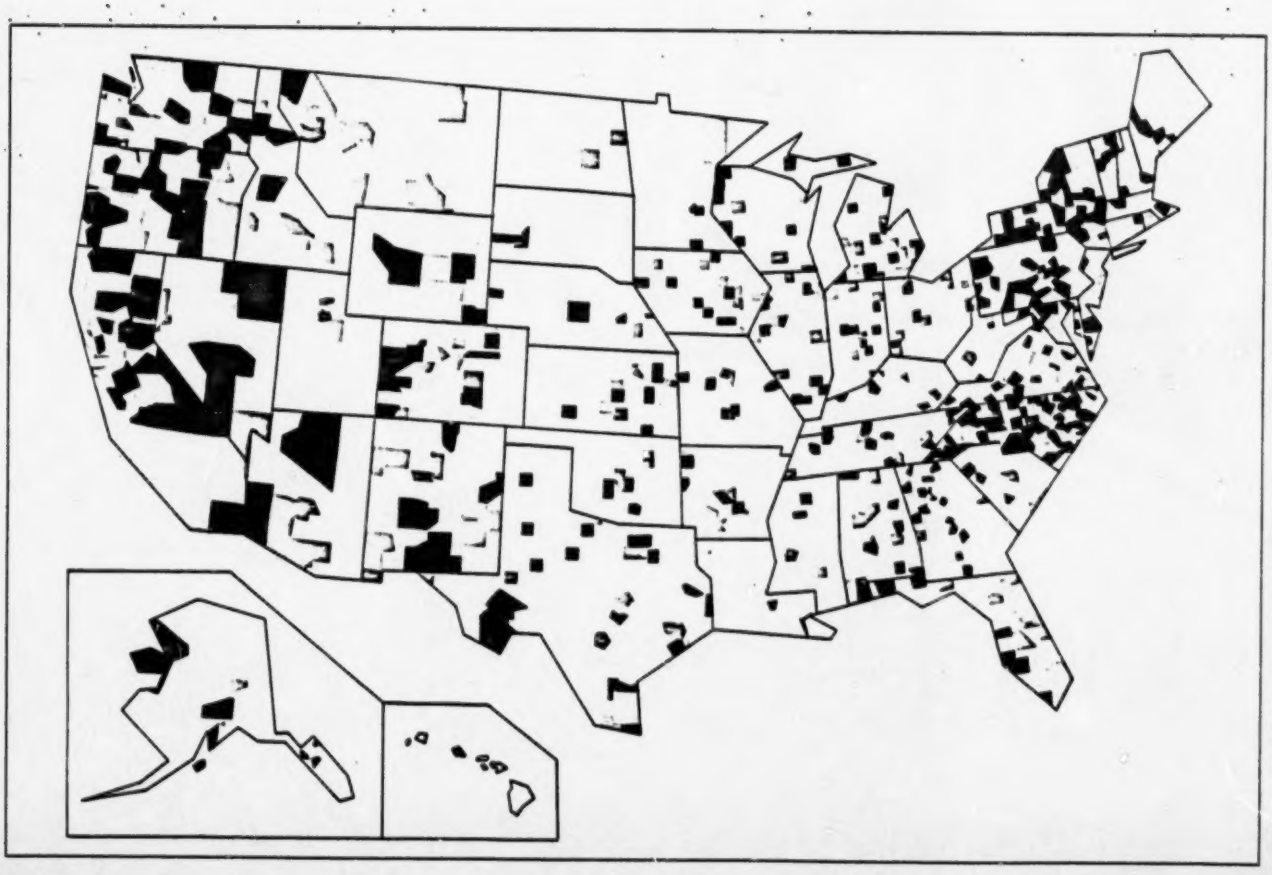
Figure 51.
Percentage distribution of women younger than 20 who obtained abortions, by methods of contraception used before conception and three weeks after the abortion, eight states, 1980 (N=445)



1/4 Million Teens in Need of Abortions Live in Areas Without Enough Facilities

Only 23 percent of U.S. counties have any facility providing abortions, and only 16 percent of counties have a facility providing as many as 30 abortions a year. Some 225,000 teenagers estimated to be in need of abortion services live in such unserved or poorly served counties. The need to travel to other, sometimes distant, communities to obtain abortions places a special burden on teenagers, who are often unable to afford the increased cost involved in travel and overnight stays, and are generally not familiar enough with the medical system to find out-of-town facilities that will serve their needs. Services are especially sparse in nonmetropolitan areas of the country. In Mississippi, the Dakotas and West Virginia, three-quarters of those in need of abortions live in counties that have no abortion facility.

Figure 52.
U.S. counties with at least one identified abortion provider, by number of abortions reported, 1978



*All abortions > 5 rounded to nearest 10.

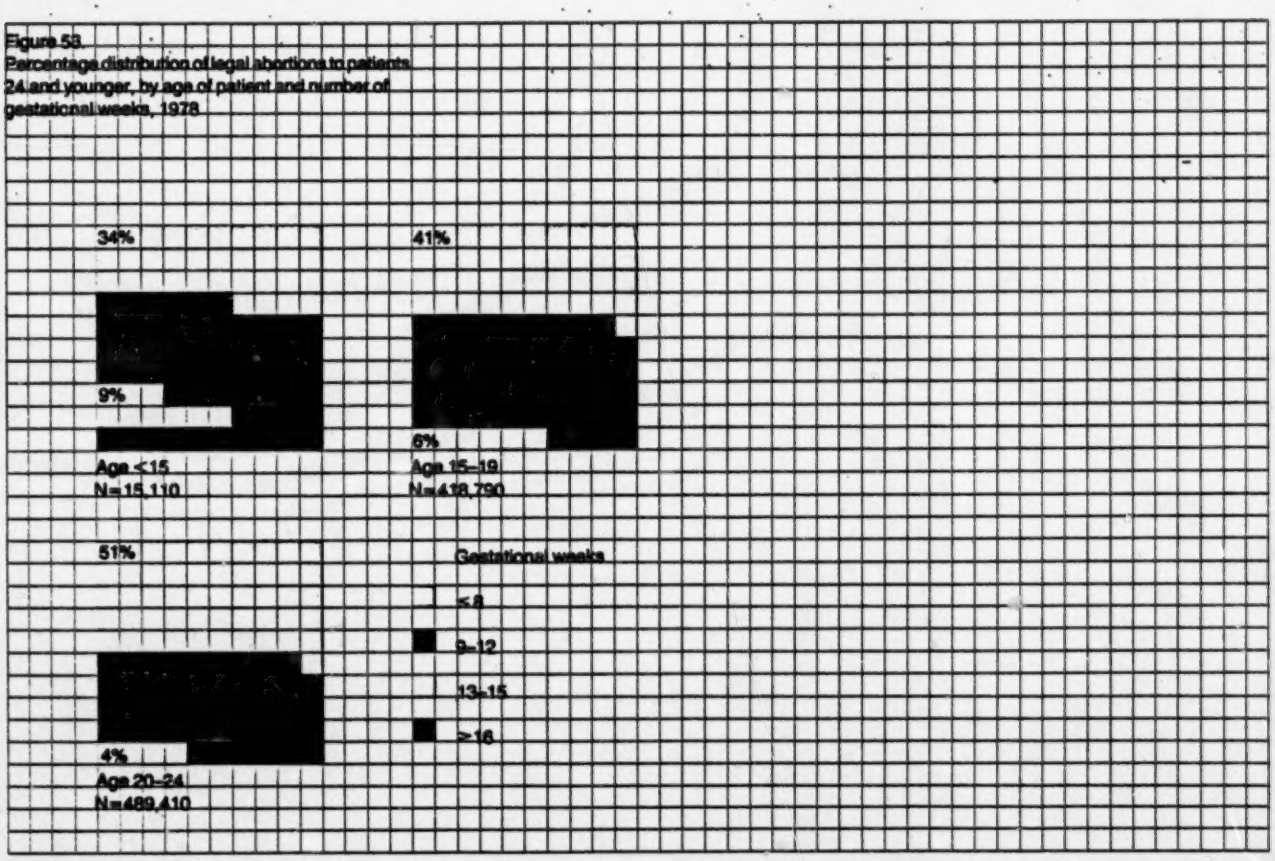
Teens More Likely to Delay Abortions To Later, Riskier Weeks of Gestation

Teenagers are less likely than women in their 20s to obtain abortions at the safer, earlier weeks of gestation. The younger the teenager, the more likely she is to have a delayed abortion. Thus, only 34 percent of abortions obtained by girls aged 15 and younger are performed at eight or fewer weeks' gestation, compared to 41 percent of abortions among 15–19-year-olds and 51 percent of those obtained by women aged 20–24. At the other extreme, 14 percent of abortions obtained by girls younger than 15 are performed at 16 weeks' gestation or later, compared to just seven percent of abortions among those aged 15–19 and four percent of abortions among women aged 20–24.

The risk of death and major complications from abortion rises with every week the procedure is delayed after the eighth week. Abortions that are delayed to the 16th week or later are as much as 13 times more dangerous than those performed at eight or fewer weeks.

Many factors have been cited as responsible for this delay, including difficulty of access because of geography (eight in 10 counties have no facility providing abortions). Fifty-five percent of teenagers who obtain abortions have to travel to other, often distant, counties to get them; such travel is usually more of a problem for teenagers than adults. Cost, an especially acute problem since the Hyde Amendment and its state counterparts cut off most public funding for abortions, also hinders access. Parental consent requirements, lack of familiarity with the medical system, irregular menstrual patterns and the psychological tendency of some young people to deny unpleasant truths are other factors that are believed to lead to delay.

Figure 53.
Percentage distribution of legal abortions to patients 24 and younger, by age of patient and number of gestational weeks, 1978

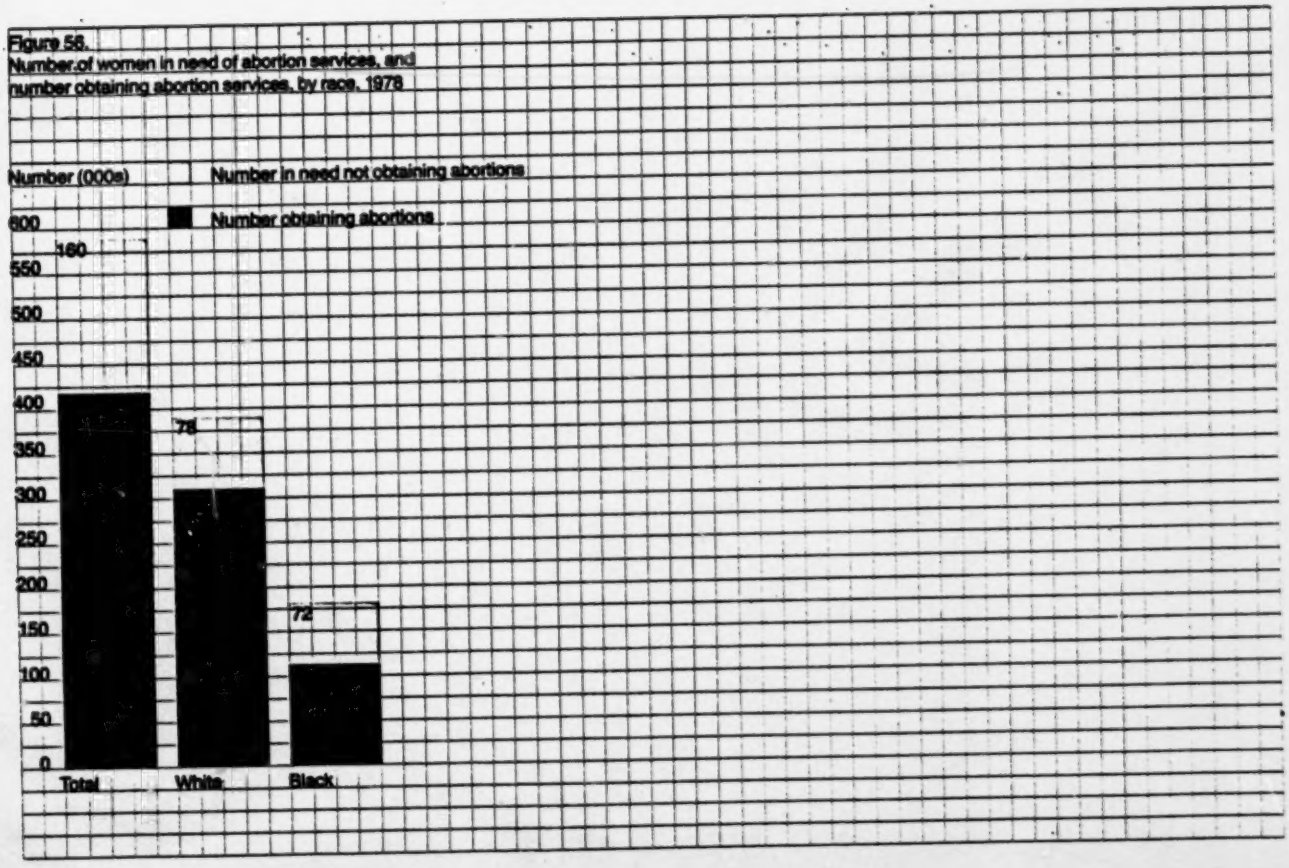


160,000 Teenagers Who Wanted Abortions In 1978 Were Unable to Obtain Them

It is estimated that if abortion services had been fully available and accessible in 1978, at least 579,000 women aged 15–19 would have obtained the procedure. About three in 10 of the teenagers estimated to want and need abortion services were unable to obtain abortions—a total of 160,000 teenagers who, as a result, had unintended births. These represent about six in 10 of all teenagers who had unintended births.

At least two in 10 white and four in 10 black teenagers in need of abortion services in 1978 were unable to obtain them.

Figure 58.
Number of women in need of abortion services, and number obtaining abortion services, by race, 1978



Document #15

JOURNAL OF ADOLESCENT HEALTH CARE 1:18–25, 1980

ORIGINAL ARTICLES

Adolescent Abortions in the United States

WILLARD CATES, JR., M.D., M.P.H.

Despite the fact that adolescent females have a more negative reaction to abortion than older women, they are apparently more likely to use legal abortion to prevent unplanned births. The most important variable affecting abortions among teenagers is the significantly later gestational age at which their procedures are performed. After adjusting for this factor, teenagers have generally lower morbidity and mortality rates from legally induced abortions than do older women. The scientific literature is inconclusive about whether present abortion methods will have any harmful effects on subsequent desired pregnancies. Current efforts to restrict abortion services for teenagers will probably produce a negative public health impact by encouraging delay in obtaining abortions after deciding to terminate a pregnancy.

KEY WORDS:
Abortion, legal
Abortion, morbidity
Abortion, mortality
Teenage pregnancy

The problem of pregnancy among teenagers has received considerable public attention. On one hand, births to teenagers are down (1) and contraceptive use among teenagers is up (2). On the other hand, the total number of pregnancies to teenagers has grown, as has the total number of abortions to teenagers (Figure 1). In 1977, the latest year for which data are available, teenagers accounted for over 400,000 induced abortions and approximately 1.2 million pregnancies; another 220,000 women conceived at age 19 years and completed their pregnancies at age 20 years. (3). At the current rates, up to 40% of today's 14-year-olds will be pregnant once before they are 20 (3).

Most officials concerned with the problems of teenage pregnancy prefer a primary prevention program, namely, avoiding unplanned pregnancies rather than unplanned births. However, this article discusses the less desirable issue of secondary prevention, namely, the means of preventing these unplanned births after the unplanned pregnancy occurs. This involves the often difficult choice, especially for a teenager, between terminating and continuing her pregnancy. The focus is on the attitudes toward and utilization of abortion by teenagers, the risks of abortion relative to those of other alternatives for teenagers, the public health impact of the increasing availability of abortion for teenagers, and finally the current threats to abortion services for pregnant teenagers.

Attitudes and Utilization

Attitude surveys have generally shown that American teenagers are less likely than women in their middle reproductive years to approve of abortion; moreover, younger teens are more negative than older teens about abortion (4). Most teenagers respond to questions about abortion, as about other issues, in moral absolute terms (5). Those who are opposed to abortion tend to view pregnancy termination as murder or feel the unplanned pregnancy is a just consequence of engaging in sexual activity. Those who favor a woman's right to choose abortion see the social and familial consequences of unplanned pregnancy as wrong.

While attitude surveys indicate teenagers, more than older women, disapprove of abortion, a disproportionate number of abortions is obtained by teenagers (Figure 2). Although teenagers form about 17% of the population of childbearing women, since 1972 they have accounted for about

From the U.S. Department of Health, Education, and Welfare Public Health Service, Center for Disease Control, Bureau of Epidemiology, Family Planning Evaluation Division, Atlanta, Georgia.
Direct represent requests to: Willard Cates, Jr., M.D., M.P.H., Center for Disease Control, Atlanta, GA 30333.
Manuscript accepted February 5, 1980.

ISSN 0197-0070/80/010018-08$02.25
© Society for Adolescent Medicine, 1980
Published by Elsevier North Holland Inc., 52 Vanderbilt Ave., New York, NY 10017

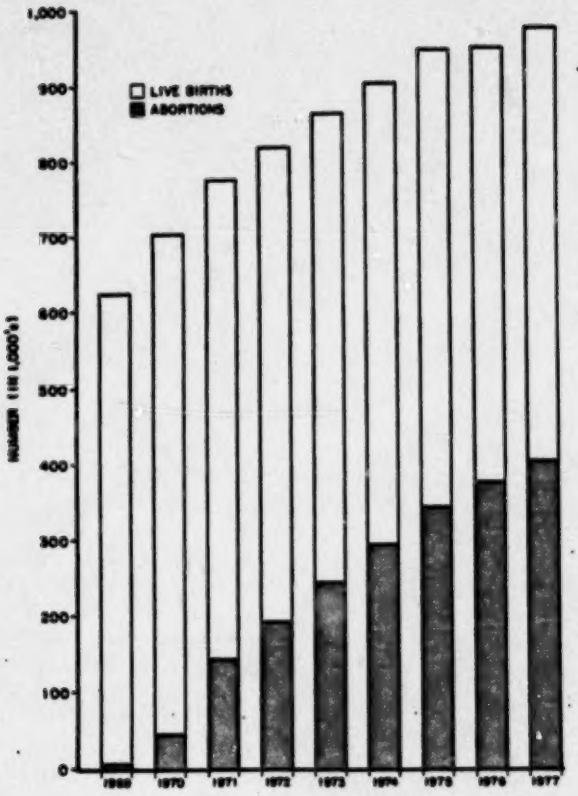


Figure 1. *Live births and abortions to teenagers in the United States, 1969–1977.*

33% of all abortions (6). The remarkable stability of the percentage of abortions for teenagers may indicate that, compared with older women, teenagers are not having an increased proportion of unplanned pregnancies. In 1977, the percentage fell slightly (see Figure 2), but this change may reflect a reporting artifact (6). Alternatively, it may reflect the fact that there were fewer teenagers at risk of pregnancy in 1977 than before (7).

The percentage of abortions to teenagers rose with each year of age through 18 (Table 1), a trend that parallels that of teenage sexual activity (2). Forty-four percent of all abortions to teenagers were obtained by women ≤ 17 years old, although this estimate is probably low. The apparent "clustering" of abortions at age 18 may result from younger women's reporting an age of legal adulthood in order to avoid being considered a minor.

Teenagers have higher abortion ratios (abortions/live births) than older women, except for women aged 40 years or older (Figure 3). Abortion

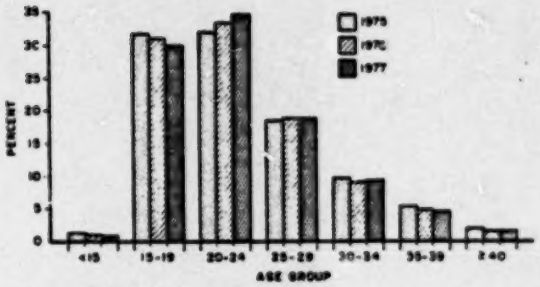


Figure 2. *Percent distribution (based on total number with age known) of reported legal abortions, by age, in all states with data available for 1975 (34 states), 1976 (36 states), and 1977 (37 states). (From Table 6 of 1975, 1976, and 1977 Abortion Surveillance Reports.)*

ratios appear to provide a good indicator of the percentage of unplanned pregnancies. Since 1975, women ≤ 14 years old have been more likely to terminate pregnancies through abortion than through a live birth. As teenagers get older, their abortion ratios generally fall (Table 1), implying that an increasing percentage of their pregnancies are planned and therefore continued to term. The elevated abortion ratio for 18-year-olds probably indicates the same overreporting tendency mentioned above.

Race is a much less important factor for teenagers than for older women in the decision either to terminate or to continue a pregnancy (8–10). The proportion of abortions obtained by whites or by blacks and other nonwhite teenagers is similar to that obtained by older women of the same races (Table 2). Between 1972 and 1974, black women accounted for approximately 25% of abortions for both teenagers and older women (6). This percentage has probably risen in the past 3 years, since the overall percentage of abortions to women of black

Table 1. Reported Legal Abortions Obtained by Teenagers, Percent Distribution, and Abortion Ratio: United States, 1977

Age (years)	Percent distribution		Abortion ratio*
	Separate	Cumulative	
13	0.7	0.7	1070
14	3.1	3.8	
15	7.2	11.0	718
16	13.8	24.8	612
17	19.1	43.9	529
18	28.5	72.4	581
19	27.6	100.0	457

Source: Center for Disease Control. Abortion Surveillance, 1977. Issued September, 1979

*Abortions per 1000 live births.

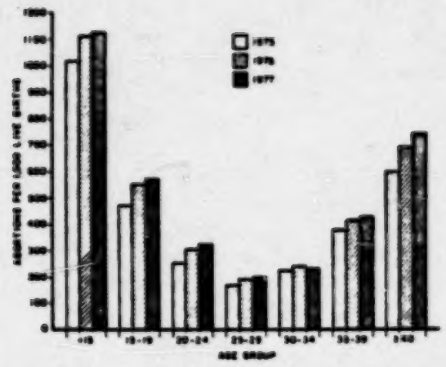


Figure 3. *Legal abortions, by age, in the United States, 1975–1977. Ratios are based on percent distribution shown in Figure 2 applied to total legal abortions reported to the Center for Disease Control, 1975–1977, and total U.S. live births by age of mother, 1975–1977, from Monthly Vital Statistics Reports, National Center for Health Statistics.*

and other nonwhite races has risen. However, data from states reporting age and race variables indicate that the relative proportions have not changed.

Teenagers have consistently waited until later in their pregnancy than older women to have their abortions (11). Nearly half of all abortions performed after 12 weeks of pregnancy are in teenagers (12). Adolescents were twice as likely as older women to obtain abortions after 12 weeks (Table 2). Moreover, the teenager's tendency to delay abortion is exaggerated at the later gestational ages; teenagers have 70% more abortions than do older women at 13–15 weeks of pregnancy but 100% more abortions at ≥ 16 weeks. The age of the teenager also influences the stage of gestation at which she obtains her abortion. Younger teenagers are even more likely to have later abortions than

Table 2. Estimated Percent Distribution of Legal Abortions Obtained by Teenagers, by Race and Gestational Age

	Years of age	
	≤ 19	≥ 20
Race		
White	72.9	73.5
Black and other	27.1	26.5
Weeks gestation		
≤ 8	33.7	44.8
9–12	47.7	44.3
13–15	7.3	4.4
≥ 16	11.3	5.5

Sources: Tietze C: Legal abortions in the United States: Rates and ratios by race and age, 1972–1974. Fam Plann Perspect 9:12–15, 1977; Cates W Jr, Tietze C: Standardized mortality rates associated with legal abortion: United States, 1972–1975. Fam Plann Perspect 10:109–112, 1978

are older teenagers; in states with data available in 1977, 23% of all abortions to females ≤ 14 years of age were beyond 12 weeks, vs. 12% to women 15–19 years and 8% to women ≥ 20 years. Because gestational age is the most important determinant of abortion complications (13), this tendency for teenagers to delay has the largest single effect on the risk to teenagers for complications and death from abortions.

In general, the data indicate multiple causes of delay even for the same pregnancy (11). Factors involving circumstances that the pregnant teenager can control include: ignorance of the signs of pregnancy until it is physically obvious; psychological denial of the pregnancy; ambivalence about the desirability of giving birth to a child; ambivalence about abortion relative to other options such as giving the baby up for adoption; pressure from influential people to have the child; lack of information on the availability of abortion; embarrassment about pregnancy; fear of pain or side effects after abortion; and lack of money. Other factors outside the control of the pregnant teenager may also lead to delay: lack of local abortion facilities; administrative requirements causing delay in processing applications; legal requirements for parental notification or approval; physician or hospital resistance to abortion for teenagers; incorrect diagnosis of pregnancy because of a false-negative pregnancy test or failure to perform a pelvic examination; and incorrect estimation of length of gestation by clinicians.

Although many of these factors can be eliminated through health education programs, sophisticated analyses document that a large proportion of delay is related to individually oriented factors (14). This idiosyncratic etiology strongly implies that the problem of delayed abortions, especially those for teenagers, will not be significantly influenced by public health interventions. Thus, continued efforts are needed to make late abortion procedures safer, cheaper, more readily available, and more acceptable to the women undergoing them.

Risks of Abortion for Teenagers

While many factors influence whether the pregnant teenager terminates or continues her pregnancy, the risks of morbidity and mortality are important considerations. Although our data from the CDC show that abortion, like any other surgical procedure, involves some risk, it also shows that the risk of complications or death for teenagers is no greater than that for older women (Table 3).

Table 3. Short-term Complication Rates and Death-to-Case Rates for Legal Abortion, by Age and Abortion Method

Age (years)	Complication rates[a]		Death-to-case rates[b]
	Suction curettage	Saline instillation	
≤ 17	0.3	1.4	1.8
18–19	0.4	1.4	
20–24	0.3	1.9	4.0
25–29	0.4	2.2	3.1
≥ 30	0.4	3.3	5.1

Sources: Joint Program for the Study of Abortion/CDC, unpublished data; Cates W Jr, Tietze C: Standardized mortality rates associated with legal abortion: United States, 1972–1975. Fam Plann Perspect 10:109–112, 1978

[a]Major complications per 100 procedures.
[b]Deaths per 100,000 abortions.

Short-Term Morbidity

For suction curettage procedures performed at ≤ 12 weeks of gestation, teenagers and older women have a similar risk of short-term major complications (see Table 3). With saline instillation procedures, however, age is an important factor influencing the risks (see Table 3). Major complication rates were lower for teenagers than for any other age group, and complication rates rise with age. Women over 30 were 2.3 times more likely than teenagers to suffer major complications with saline. The same trend toward lower complication rates for teenagers generally held for two other procedures performed after 12 weeks—dilatation and evacuation and prostaglandin $F_{2\alpha}$ instillation; however, the numbers are so small that there is some overlap of complication rates among the different age groups.

Mortality

Teenagers have a lower death-to-case rate than older women after a legally induced abortion (see Table 3). Our data demonstrate that in the period 1972–1975, the crude death-to-case rate for teenagers was 2.2 deaths per 100,000 procedures (12). However, because teenagers obtain their abortions later in pregnancy than do older women, these comparative rates must be standardized for gestational age. After this adjustment is made, the death-to-case rate for teenagers is reduced to 1.8 per 100,000 procedures. Most recently, this rate has been even lower since the overall risk of dying from induced abortion declined markedly in 1976 and 1977 (6).

While teenagers have lower death-to-case rates than do older women from legally induced abortion, they also have lower risks of dying from complications of pregnancy, childbirth, and the puerperium. To compare the relative risks for teenagers of terminating vs. continuing pregnancy, we contrasted the standardized death-to-case rates for legally induced abortion with the standardized rates for death from other pregnancy-related causes (12), excluding abortion and ectopic pregnancy. We adjusted the birth-related fatality rate for teenagers by using the same age and race distributions we used in standardizing abortion-related mortality. In the period 1972–1975, teenagers who continued their pregnancies had a standardized death-to-case rate of 9.5 deaths per 100,000 live births; as noted above, the standardized death-to-case rate for legally induced abortions was 1.8 per 100,000 procedures. Thus, the risk that a teenager would die from pregnancy continuation was fivefold higher than that from pregnancy termination.

The increased risk of maternal mortality for teenagers may partly reflect their tendency not to obtain adequate prenatal care (15); yet, this factor alone would be unlikely to account for the fivefold risk associated with pregnancy continuation. Moreover, the data presented above have several limitations which suggest that a fivefold risk may be a minimum estimate: (a) Birth-related mortality rates using this analysis were based only on deaths attributed to complications of pregnancy, childbirth, and the puerperium, and not on delivery-associated deaths attributed to other causes such as cardiovascular disease. Such associated deaths are included in abortion-related deaths. (b) Data on abortion deaths of teenagers include 4 cases of planned pregnancies that were terminated for medical indications. Thus, the abortion group included some of the highest risk patients whose abortions were performed because the pregnancy was life threatening. Thus, the comparison undercounts pregnancy-related deaths relative to abortion-related deaths of teenagers.

Between 1972 and 1978, 29 teenage women died after legally induced abortion. The causes of these deaths to teenagers were slightly different than those of older women who died after legal abortions. Teenagers were more likely to die from infection but less likely to die from hemorrhage. Twelve (41%) teenage women died from infection, usually related to unrecognized retained products of conception after a uterine evacuation procedure. In 9 of these 12 cases, the teenage woman delayed seeking treatment of postabortion symptoms

suggesting infection, possibly because of their reluctance to let their parents know that they had had an abortion procedure. Preventive approaches could emphasize both counseling teenagers about the need to act as soon as possible if they suspect any complications, and providing treatment facilities that will be able to respond immediately to any complications in a confidential manner without involving the parents.

Only 1 (3%) teenage woman died from hemorrhage, less than the 15% of older women who died from this cause. Although the numbers are small, we can speculate that teenagers may have a greater hematologic reserve to sustain them through an acute episode of blood loss and hypovolemia. Seven (24%) teenage women died from embolic events, including 3 from suspected amniotic fluid emboli after saline or prostaglandin instillation procedures, 2 from pulmonary thromboemboli, and 2 from air emboli.

Fifteen teenagers died after illegally induced abortions between 1972 and 1978, accounting for 18% of the 82 illegal abortion deaths that occurred during this interval. Because illegal abortion is a clandestine event, no accurate denominators are available to calculate death-to-case rates for teenagers compared with older women. However, the proportion of teenagers who died after illegally induced abortion is similar to the proportion of teenagers (21%) who died after legally induced procedures during these same years. If these numerators are accurate reflections of the denominators, this indicates that teenagers are no more likely than older women to be using illegally induced abortion since 1972.

Emotional Complications

Very few teenagers have severe psychiatric complications after induced abortion; most are relieved to have terminated an unplanned pregnancy (16). Studies have shown, however, that teenagers are at higher risk than older women of suffering short-term psychological sequelae after induced abortion (16). Relatively more teenagers than older women suffered anxiety, depression, sadness, guilt, and regret. The most important factor affecting a woman's reaction to her abortion was the level of support provided by influential others including parents, partners, and peer group. The psychological reaction to abortion was significantly more favorable when parents and partners were supportive.

The type of abortion procedure also affects the psychological sequelae; uterine curettage procedures are associated with more favorable postabortion reactions than are labor-like instillation procedures (17). Because teenagers are more likely to delay abortion until the later gestational ages when instillation procedures may be used, clinicians should be aware of the emotional impact of the particular method they use.

Although teenagers have a higher rate of emotional complications after abortion than older women, younger women also have a higher rate of psychiatric complications after term birth. In England, the frequency of postpartum depression was highest for younger women (18). Although rates were not stratified by age, another study in England showed a threefold higher rate of postpartum depression for women whose planned pregnancies went to term than the rate for women who terminated their pregnancies by induced abortion (19). Thus, teens who continue unplanned pregnancies to term appear to be at even higher risks of psychological sequelae than if they terminated their pregnancies.

Long-Term Effects

Perhaps of greater concern to pregnant teenagers is whether induced abortion will threaten later desired pregnancies. Because many teenagers may eventually wish to bear children, they should naturally be accurately informed of any known long-term risks of terminating pregnancy. However, studies of late complications after induced abortion have produced conflicting results and make the subject of long-term sequelae an unresolved issue (20).

Recent data implicate three factors influencing whether an induced abortion will affect future pregnancies: (a) the abortion procedure used, (b) the patient's gravidity, and (c) the number of induced abortions they have already had. In regard to various abortion procedures, the wider the caliber of dilatation, the wider the cervical os 6 weeks later (21); sharp curettage procedures frequently require wider dilatation and have been associated with increased risks of midtrimester spontaneous abortion and low birth weight in subsequent pregnancies (22,23). However, suction curettage procedures are not apparently associated with a significantly increased risk of adverse outcome in subsequent pregnancies.

Women who terminated their first pregnancy by induced abortion were at higher risk for later second-trimester spontaneous abortion (23). The rates of second-trimester spontaneous abortion were also higher for women who had more than one pregnancy terminated by induced abortion (23). In England, women who were < 15 years old at the time of their abortion had more adverse events associated with later pregnancies than did older women who had abortions, perhaps because there was greater trauma to the younger women's smaller, tighter cervixes or because wider dilatation was necessary because of their later average gestational age (24).

Although the issue is unresolved, several clinical recommendations can be made for teenagers in order to reduce the possible risks of late sequelae after legally induced abortion. First, teenagers considering pregnancy termination should be encouraged to decide as soon as possible in order to reduce both the short-term and the possible long-term risks from abortion or allow proper prenatal care early in pregnancy. Second, if a nulliparous teenager with a small cervix requests an abortion that would require dilatation of > 11 mm, the use of laminaria tents should be seriously considered. Third, teenagers who have had one other induced abortion and plan to have a child in the future might stress the effectiveness of a contraceptive method more than its safety.

Public Health Impact of Teenage Abortion

The availability of legal abortion for teenagers has had an impact on four public health parameters: mortality, fertility, contraceptive usage, and marriage patterns for teenagers. The total number of teenage abortion-related deaths (including those from spontaneous abortions as well as legally and illegally induced procedures) has declined markedly since legally induced abortion has been more readily available (25). This pattern probably means that many teenagers are now choosing to terminate unplanned or unwanted pregnancies through safer legal channels rather than resorting to the less safe, self-induced or nonphysician-induced procedures.

Legalization of abortion has been temporally associated with a decline in out-of-wedlock birth rates in New York City (26), California (27), Oregon (28), and the United States as a whole (29). Because a large proportion of teenage out-of-wedlock births were unwanted, and because more than 85% of abortions to teenagers have been to unmarried women, some increase in the number of abortions to teenagers probably affected unintended fertility. State-to-state variation in teenage childbearing shows a significant correlation with their abortion/live birth ratio (30). This also indicates that legal abortion is used by many women to limit their unintended births.

The increasing utilization of legally induced abortion by teenagers has been alleged by some to cause a decrease in their use of contraception. However, at least four different approaches have demonstrated the opposite, namely, that there has been an increasing use of contraception during the era of the increasing availability of legal abortion:

First, case series reports have documented that teenagers obtaining abortions were more likely to be using effective forms of contraception 6 months after their procedure than they were before their unplanned pregnancy (31,32).

Second, the national patterns of increasing sexual activity among teenagers contrasted to the declining birth rates among the same group indicate that teenagers are becoming increasingly able to control their fertility through either contraceptive practices or abortion. The proportion of never-married 15–19-year-olds having unprotected intercourse decreased by one-third between 1971 and 1976 (2). Moreover, in 1976, almost one-third of the sexually active teenagers were using oral contraceptives, twice the proportion of 1971; the increase was more dramatic for 15–17-year-olds than for older teens (2).

Third, between 1960 and 1974, the conception rates actually decreased between an estimated 4–36%, depending on the assumption about the number of illegal abortions performed in the earlier years (33). This decline is consistent with increasing contraceptive use to prevent conceptions.

Fourth, although a substantial majority of young unmarried women who became pregnant and had an abortion were not contracepting, they were no less likely, and were probably more likely, to be contracepting than young women who unintentionally became pregnant and did not have an abortion (34).

Thus, the evidence to date suggests that the availability of legally induced abortion is associated with an increasing use of contraception by teenagers, compared with the era when legal abortion was not widely available.

However, providing contraceptive services for teens will not eliminate the need for abortion. Even intensive service programs emphasizing contraception that are directed at young women have required abortion to prevent unintended births. For example, despite a 1972 law in Georgia allowing minors to consent for their own contraception, it was not until abortion was readily available that the decline in births in Georgia teenagers 14 years or younger was observed (35). This decline first occurred in the same geographic area where the abortion facilities were most accessible and where abortion utilization was the highest. Moreover, in New Haven, Connecticut, a high proportion of young women who participated in a comprehensive pregnancy-care service for school age mothers had a second unplanned pregnancy which they terminated through legally induced abortion (36). Without the availability of legal abortion, these women would have had to choose between illegal abortion and a second unplanned birth.

The availability of legal abortion has also affected teenage marriage rates. In the United States, before 1969, trends in crude marriage rates among states with different levels of legal abortion services were similar. Beginning in 1970, especially among teenagers, states with a high legal abortion/live birth ratio began exhibiting significant declines in crude marriage rates that were not experienced by states with relatively low ratios (37). This suggests that liberalized abortion policies might be providing teenagers with a new alternative to marriage forced by premarital pregnancies, and therefore be related to the decline in marriage rates. Because teenage marriage and childbearing has a greater risk of negative repercussions than later unions (38), these lower marriage rates may have a positive health impact. Young parents acquire less education than their contemporaries; their marriages are less stable than those of their contemporaries who postpone childbearing, and couples who become parents as teenagers expect to have more children than they want (39).

Current Threats to Abortion for Teenagers

Two approaches are being used in the United States to limit the availability of legal abortion services for teenagers: (a) requiring parental notification/consent to obtain the procedure and (b) restricting public funds for abortion. Many "Akron-type" ordinances have been passed at state and local levels mandating that if a pregnant woman is < 18 years old and unmarried, her parents or guardian must be notified at least 24 hours before the procedure (40). If they cannot be located, a 72-hour waiting period is required to allow a certified notification to reach their last known address. While it is desirable to involve the teenager's parents in the abortion decision when possible, frequently their response is punitive rather than supportive. Moreover, these parental notification provisions create additional delays for many pregnant teenagers because anxiety about informing their parents leads to conflict in decision making (40). Counseling by trained adults can help the teenager decide whether to terminate her pregnancy and how to cope effectively with the emotional consequences of her decision.

Restricting public funds for abortion also affects teenagers who are eligible for public payments for medical services. Teenagers might qualify for public payment in one of two ways: (a) they could be dependent on parents who qualify for public funding for medical services or (b) they could be single parents who are eligible for public support. If they become pregnant, these low-income teenagers are eligible for public funding for medical services if they choose to continue their pregnancies but must finance their own abortions if they choose to terminate their pregnancies. Current data show that most low-income women who would once have used publicly funded, legally induced abortion to terminate unwanted pregnancies continued to obtain legal abortion, using instead a combination of personal funds and state-based subsidy (41). Nonetheless, these women with limited funds who must at least partially pay for abortion services do not have this money available for other necessities. The effects of these financial compromises have not yet been determined.

Conclusion

Despite the fact that teenagers are more negative about abortion than older women, teenagers are apparently more likely to use legal abortion to prevent unplanned births. The most important variable affecting teenagers who have abortions is that the procedures are performed significantly later in pregnancy. After adjusting for this factor, teenagers have generally lower morbidity and mortality rates than do older women from legally induced abortion. For teenagers, the risk of dying from continuing an unplanned pregnancy to term is at least fivefold higher than that of terminating it.

The scientific literature is inconclusive about whether abortion methods used for today's teenagers will be associated with any harmful effects on later desired pregnancies. Rather than discouraging the use of contraception, the availability of legal abortion since 1970 has been associated with increased use of contraceptives by teenagers. Current efforts to restrict abortion services for teenagers will probably have a negative public health impact by encouraging delay once the decision to terminate a pregnancy has been made.

References

1. Ventura SJ: Teenage childbearing: United States, 1966–1975. Monthly Vital Statistics Report 26(5):1–14, 1977
2. Zelnik M, Kantner JF: Sexual and contraceptive experience of young unmarried women in the United States, 1976 and 1971. Fam Plann Perspect 9:55–56, 58–63, 67–71, 1977
3. Tietze C: Teenage pregnancies: Looking ahead to 1984. Fam Plann Perspect 10:205–207, 1978
4. Chilman CS: Adolescent Sexuality in a Changing American Society: Social and Psychological Perspectives. Bethesda, Maryland, National Institutes of Health, 1979, pp 184–188. (DHEW Publication No. (NIH) 79–1426)
5. McCormick EP: Attitudes Towards Abortion, Lexington, Massachusetts, Lexington Books, 1975
6. Center for Disease Control: Abortion Surveillance, 1977. Issued September 1979
7. U.S. Bureau of the Census: A Statistical Portrait of Women in the United States. Current Population Reports, Series P–23, No. 58, 1976
8. Tietze C: Legal abortions in the United States: Rates and ratios by race and age, United States, 1972–1974. Fam Plann Perspect 9:12–15, 1977
9. Cates W Jr: Legal abortion: Are American black women healthier because of it? Phylon 38:267–281, 1977
10. Center for Disease Control: Surgical Sterilization Surveillance; Tubal Sterilization 1970–1975. Issued July 1979
11. Bracken MB, Kasl SV: Delay in seeking induced abortion: A review and theoretical analysis. Am J Obstet Gynecol 121:1008–1019, 1975
12. Cates W Jr, Tietze C: Standardized mortality rates associated with legal abortion: United States, 1972–1975. Fam Plann Perspect 10:109–112, 1978
13. Cates W Jr, Schulz KF, Grimes DA, Tyler CW Jr: The effect of delay and choice of method on the risk of abortion morbidity. Fam Plann Perspect 9:266–273, 1977
14. Burr WA, Schulz KF: Delayed abortion in an area of easy accessibility. JAMA 244:44–48, 1980
15. Hutchins FL Jr, Kendall N, Rubino J: Experience with teenage pregnancy. Obstet Gynecol 54:1–5, 1979
16. Bracken MB, Hackamovitch M, Grossman G: The decision to abort and psychological sequelae. J Nerv Ment Dis 158:154–162. 1974
17. Rooks JB, Cates W Jr: Emotional impact of D&E versus instillation. Fam Plann Perspect 9:276–278, 1977
18. Clarke M, Williams AJ: Depression in women after perinatal death. Lancet I:916–917, 1979
19. Brewer C: Incidence of post-abortion psychosis: A prospective study. Br Med J 1:476–477, 1977
20. Cates W Jr: Late effects of induced abortion: Hypothesis or knowledge? J Reprod Med 22:207–212, 1979
21. Johnstone FD, Beard RJ, Boyd IE, et al: Cervical diameter after suction termination of pregnancy. Br Med J 1:68–69, 1976
22. World Health Organization Task Force on the Sequelae of Abortion: Gestation, birthweight, and spontaneous abortion in pregnancy after induced abortion. Lancet 1:142–145, 1979
23. Harlap S, Shiono PH, Ramcharan S, et al: A prospective study of spontaneous fetal losses following induced abortions. N Engl J Med 301:677–681, 1979
24. Russell JK: Sexual activity and its consequences in the teenager. Clin Obstet Gynecol 1:683–698, 1974
25. Cates W Jr, Rochat RW, Grimes DA, Tyler CW Jr: Legalized abortion: Effect on national trends of maternal and abortion-related mortality (1940–1976). Am J Obstet Gynecol 132:211–214, 1978
26. Pakter J, O'Hare D, Nelson F, et al: A review of 2 years experience in New York City with a liberalized abortion law, in Osofsky HJ, Osofsky JD (eds): The Abortion Experience: Psychological and Medical Impact. Hagerstown, Maryland, Harper & Row, 1973, pp 47–93
27. Sklar J, Berkov B: The effects of legal abortion on legitimate and illegitimate birth rates: The California experience. Stud Fam Plann 4:281–292, 1973
28. Quick JD: Liberalized abortion in Oregon: Effects on fertility, prematurity, fetal death, and infant death. Am J Public Health 68:1003–1008, 1978
29. Sklar J, Berkov B: Abortion illegitimacy and the American birth rate. Science 185:909–915, 1974
30. Brann EA: A multivariate analysis of interstate variation in fertility of teenage girls. Am J Public Health 69:661–666, 1979
31. Margolis A, Rindfuss R, Coghlan P, Rochat RW: Contraception after abortion. Fam Plann Perspect 6:56–60, 1974
32. Miller E, McFarland V, Burnhill MS, Armstead JW: Impact of the abortion experience on contraceptive acceptance. Advances Planned Parenthood 12:15–28, 1977
33. Baldwin WH: Adolescent pregnancy and childbearing—Growing concerns for Americans. Population Bulletin 31:16–17, 1976
34. Zelnik M, Kantner JF: Contraceptive patterns in premarital pregnancy among women aged 15–19 in 1976. Fam Plann Perspect 10:135–142, 1978
35. Shelton JD: Very young adolescent women in Georgia: Has abortion or contraception lowered their fertility? Am J Public Health 67:616–620, 1977
36. Jekel, JF, Tyler NC, Klerman LV: Induced abortion and sterilization among women who became mothers as adolescents. Am J Public Health 67:621–625, 1977
37. Bauman KE, Anderson AE, Freeman JL, Koch GG: Legal abortions and trends in age-specific marriage rates. Am J Public Health 67:52–53, 1977
38. Menken J: The health and social consequences of teenage childbearing. Fam Plann Perspect 4:45–53, 1972
39. Trussell J, Menken J: Early childbearing and subsequent fertility. Fam Plann Perspect 10:209–218, 1978
40. Cates W Jr, Gold J, Selik RM: Regulation of abortion services: For better or worse? N Engl J Med 301:720–723, 1979
41. Gold J, Cates W Jr: Restriction of federal funds for abortion: 18 months later. Am J Public Health 69:929–930, 1979

Document #16

CHILDREN OF INCEST

Morton S. Adams, M.D., and James V. Neel, M.D., Ph.D.

Department of Human Genetics, University of Michigan, Ann Arbor, Michigan

INFORMATION on the nature of the children resulting from incestuous unions* has both practical and theoretical interest. It is of practical value in that there is a high probability that the pediatrician who serves as a consultant to agencies concerned with child placement will encounter such children and be requested to render an opinion concerning their suitability for adoption. It is of theoretical value because of the light that results of such close inbreeding throw on man's concealed genetic variability.

For many obvious reasons, the accumulation of unbiased data on the outcome of such unions, as well as suitable controls, presents difficulties, and, although there is an abundance of anecdotal material, objectively assembled series do not seem to exist. This report will describe a small series of 18 children resulting from such unions, and a like number of children whose mothers were, as nearly as possible, matched to the mothers of children of incest. The series was assembled through the cooperation of several agencies which are responsible for child care and placement in the state of Michigan.

METHODS

Prospective Ascertainment

To minimize the loss of information concerning still birth, neonatal death, and the possible selection of cases with particularly unfortunate outcomes, only cases of incest which were ascertained during pregnancy were included in the study. The mean duration of pregnancy at the time of ascertainment was 7 months. The study thus supplies no data on early fetal loss.

* Incest as used in this paper refers to brother x sister and father x daughter matings.

Determination of Paternity

Only cases of admitted and undisputed incest were accepted. Paternity exclusion tests were performed where possible to aid in the identification of children falsely reported to the agency as being the products of incest. The following genetic systems were examined by Dr. Henry Gershowitz, to whom we are most grateful: ABO, MNS (M^gN^g), Rh (D, D^u, C, c, C^w, E, e), Kitt (JK^a), Kell (K, k, Kp^a, Kp^b), Lutheran (Lu^a), Duffy (Fy^a), P, Wright (Wr^a), Lewis (Le^a, Le^b). There were no paternity exclusions in six mother-putative father-child combinations.

Long-term Evaluation of the Child

To increase the likelihood of detecting physical defects and to ensure a more accurate evaluation of mental status, all the children were examined at birth and, as near as possible, at the age of 6 months. Children with abnormal findings were followed up at varying intervals. A preschool examination when the children are age 6 years is planned.

Comparison Group

Since there was reason to suspect that the mothers of the study children did not represent a random sample of the population, they were matched as closely as possible to a comparison group with respect to age, race, weight, stature, intelligence, and socioeconomic status (Table 1). The comparison group was prospectively ascertained from unwed mothers under the care of the same agencies from which the incest cases were derived. This matching was also an attempt to remove effects attributable to the young age of the mothers and the fact that they were all primigravidae. Since the mothers in the comparison group were also

(Received October 24, 1966; revision accepted for publication March 8, 1967.)

PRESENT ADDRESS: (M.S.A.) Human Genetics Branch, National Institute of Dental Research, National Institutes of Health, Bethesda, Maryland 20014.

without the benefit of wedlock, nonspecific environmental effects peculiar to unwed mothers are at least partially controlled. Matching with respect to intelligence was difficult and a higher proportion of the women involved in incest were probably in the "dull" category.

Furthermore, of course, no matching procedure can compensate for the special psychic factors which enter into incest, factors conceivably influencing the outcome of pregnancy.[1] There was one unsuccessful abortion attempt among the father x daughter incest cases but none known among the non-incest mothers.

Estimation of the maternal intelligence was complicated by the obvious stressful situation in which the mothers found themselves. Therefore, various methods were employed including the Lorge-Thorndike Intelligence test administered by the authors and review of the results of previous psychometric testing while in school and school performance. Admittedly, these estimates are not completely satisfactory.

The babies were examined at birth by the obstetrician and/or pediatrician in attendance, and length, weight, and head circumference were measured. At the "6-month" examination, the babies were transported to the University of Michigan Medical Center where a developmental and a medical history was taken and a general physical examination was performed. Length, weight, head circumference, head height, and knee height were measured. Bone age was obtained from x-ray examination of the left wrist. Psychological testing with the Cattell Infant Intelligence test was performed by Dr. Ralph Gibson. He was not informed as to whether any given child was a product of incest.

RESULTS

The results to be presented can be divided into two groups: (1) observations

TABLE I

CRITERIA USED IN MATCHING MOTHERS OF INCEST AND COMPARISON CHILDREN

Kindred Number	*Incestuous Mother*					*Comparison Mothers*				
	Age	*Height*	*Weight (lb)*	*I.Q.**	*Socio economic*[13]	*Age*	*Height*	*Weight (lb)*	*I.Q.**	*Socio economic*[13]
7692	13	5' 4"	120	Average	1	14	5' 3"	123	100	2
9089	12	4' 10"	100	73	2	13	5' 3"	118	Average	1
8180	14	5' 3"	110	Average	2	14	5' 3"	125	Average	2
8289	14	5' 1"	100	105	1	16	5' 0"	95	High	2
9040	13	5' 6"	140	High	1	17	5' 5"	118	High	1
9042	13	5' 1"	94	80	3	13	5' 2"	130	Average	1
9134	16	5' 3"	134	High Average	2	16	5' 4"	130	High Average	4
8897	17	5' 2"	120	97	3	18	5' 2"	100	Average	3
8999	17	5' 4"	120	Average	4	16	5' 1"	108	Average	3
8069	17	5' 6"	170	111	2	17	5' 6"	130	High Average	4
8131	12	4' 9"	150	Average	1	13	5' 4"	125	114	4
8147	13	5' 5"	144	96	1	17	5' 5"	130	Average	3
8985	13	5' 2"	140	Low Average	3	13	5' 8"	130	Low Average	3
8198	16	5' 4"	112	88	4	21	5' 11"	160	Low	3
8886	17	5' 5"	118	High	2	17	5' 6"	125	High Average	2
8998	20	5' 2"	102	75	3	19	5' 3"	110	Average	4
8199	16	5' 0"	165	77	3	14	5' 7"	120	Low Average	4
7691	20	5' 3"	144	High	2	20	5' 5"	120	Average	4

* Low <90; average 90-109; high>110.

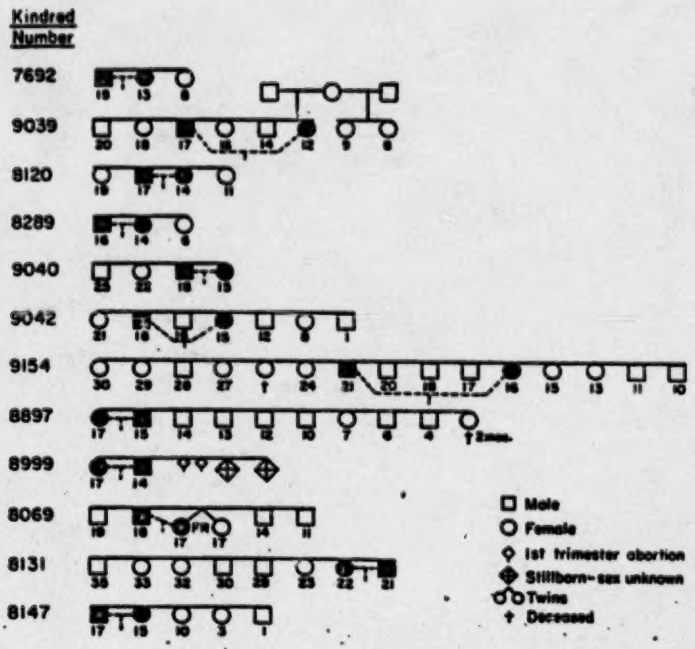


FIG. 1. Pedigrees of 12 cases of brother x sister incest.

which characterize the circumstances surrounding the production of a child of incest, the "ecology of incest," and (2) observations on the effects of incest on mortality, morbidity, and the growth and development of children who have this background.

The Ecology of Incest

BROTHER-SISTER MATINGS (FIG. 1): The involved sibs, excepting one case, were of average intelligence (range in I.Q.'s: males, 90–120, average, 110; females, 90–120, average, 103). The exceptional case involved a girl with an estimated I.Q. of 73 and her brother who was alleged to possess low average intelligence. All couples were in good health and there was no history of familial disease. In general, the socioeconomic condition of these families was not low. The occupations of the head of the household were all skilled and semiskilled. Several of the siblings of the incestuous couple had achieved college educations. The age of the female members of the couples in all but five cases were between 12 and 15 years (range, 12 to 22; average 15.6). On the average the males were 3 years older. It must be re-emphasized that while the above generalities make the brother x sister matings seem stereotyped, the situation is very complex and psychiatric evaluations are not available. As mentioned earlier, the intelligence of these young women was evaluated during a time of stress.

FATHER-DAUGHTER MATINGS (FIG. 2): The father x daughter matings were of somewhat different character. The females were older (range, 13 to 20, average, 17) than the sib pairs. Only one was less than 16 years and she was severely retarded mentally. These females were of widely divergent intelligence. One had completed 2 years of college and another was an honor student in high school. On the other hand, three of the other mothers had estimated I.Q.'s of 58, 75, and 77. The fathers

TABLE II

RESULTS OF EXAMINATIONS: BROTHER-SISTER INCEST GROUP

Kindred Number	*Physical*	*Developmental Quotient*
7602	7 lb, 13 oz, Caucasian female, failure to thrive. At age 2 mo became febrile with hepatomegaly. Died 1 hr after admission. Autopsy: hepatic glycogen storage disease, horseshoe kidney, chronic leptomeningitis.	None done
5039	5 lb, 12 oz, Caucasian male, age 2 mo, poor head control. Age 4 mo, seizures. Age 6 mo, areflexic, 3 × 3 cm bony defect in right occipital parietal region, bone age retarded.	Severe retardation.
8120	8 lb, ½ oz, Caucasian male. Normal. Bone age advanced.	92, age 4 mo 94, age 17 mo 68, age 40 mo
8280	6 lb, 2 oz, Caucasian female, left int. strabismus bilat. tibial torsion, bone age retarded. PBI-6.2 mcg %.	64, age 6 mo 79, age 18 mo 64, age 24 mo
9040	6 lb, 9 oz, Caucasian male. Respiratory distress at 6 hr. Died at 15 hr. Autopsy: pulmonary hyaline membrane.	None done
9042	5 lb, 15 oz, Caucasian female. Normal except treated for right acetabular dysplasia.	112, age 6 mo
9154	6 lb, 1½ oz, Caucasian female. Normal except for small hemangioma on right anterior chest.	119, age 6 mo
8807	6 lb, 12 oz, Caucasian female. Normal except treated for left acetabular dysplasia.	85, age 6 mo
8809	7 lb, 9 oz, Caucasian female. Normal.	118, age 6 mo
8069	5 lb, 10 oz, Caucasian female. Failure to thrive, but no abnormality.	64, age 14 mo 80, age 20 mo 56, age 26 mo 72, age 40 mo
8131	6 lb, ½ oz, Caucasian male. Normal.	64, age 6 mo 72, age 12 mo 71, age 24 mo
8147	7 lb, 3 oz, Negro male. Normal.	99, age 6 mo

were generally poorly educated and held jobs requiring low to average ability. The family living conditions and standards were frequently, by the usual sociological criteria, grossly deficient.

Effects of Incest (Tables II through VI)

GROWTH AND DEVELOPMENT: There was a normal sex distribution in both the incest and comparison group (incest, 8♀ : 10♂; comparison, 9♀ : 9♂). The average full-term child of incest was approximately one-half pound lighter at birth than the non-incest children of like sex. Although the average maternal age of both the incest and comparison groups was 16 years, none of the control mothers were as young as three of the incest mothers, a fact per

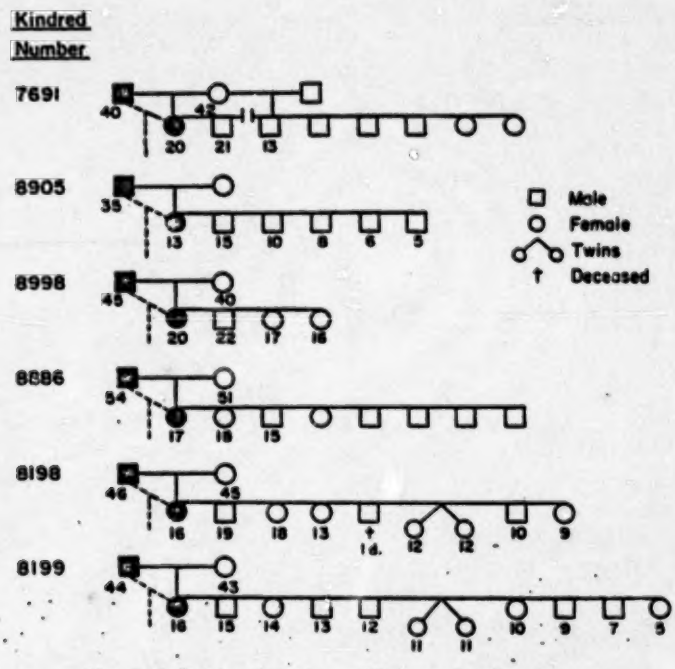


FIG. 2. Pedigrees of six cases of father x daughter incest.

haps relevant to the differences in mean birth weight. There was one premature birth (birth weight less than 5 lb) among the children of incest and two among the controls. The measurements of length and head circumference showed no clear-cut difference between the children of incest and the controls.

MORTALITY AND MORBIDITY—INCEST CHILDREN: Seven of the 18 children of incest were normal at the 6-month examination and adoption was recommended. Their I.Q.'s ranged from 98 to 119, average 110. The remaining 11 children of incest either had died or suffered from some degree of morbidity. Two of the children died in the neonatal period; one, a 1,100 gm premature infant, died within 6 hours and an autopsy was non-diagnostic. One full-term infant died at 13 hours with the respiratory distress syndrome. Pulmonary hyaline membranes were demonstrated at autopsy. Another died at the age of 2 months following an acute febrile illness of unknown etiology and was found on necropsy to have glycogen storage disease. One child had a bilateral cleft lip. Two others were severely retarded mentally, with seizure disorder and spastic cerebral palsy, and they were institutionalized. In none of these cases was the family history contributory. Three children were less severely retarded mentally, having estimated intelligence quotient's (I.Q.'s) of about 70 on repeated testing. Although mental testing at this age is difficult, the consistency of the retest results gives some credibility to the impression. However, final judgment on cases of this type is suspended.

MORTALITY AND MORBIDITY—COMPARISON CHILDREN: None of the comparison children died and none were institutionalized. None had an estimated I.Q. of less than 80 at age 6 months and only in three cases was adoption deferred awaiting repeat psychometric evaluation. Four congenital anomalies were diagnosed in as

TABLE III

RESULTS OF EXAMINATIONS: BROTHER-SISTER COMPARISON GROUP

Physical	Developmental Quotient
9 lb, 3½ oz, Caucasian female treated for acetabular dysplasia. Normal at age 8 mo.	101, age 8 mo
8 lb, 2 oz, Caucasian female, growth and development normal.	107, age 9.5 mo
3 lb, 9 oz, Caucasian male. Normal.	81, age 4 mo
6 lb, 9 oz, Caucasian male. Normal except left cryptorchidism.	100, age 10 mo
8 lb, 6 oz, Caucasian male. Normal.	100, age 18 mo
5 lb, 5 oz, Caucasian male. Normal.	105, age 8½ mo
7 lb, 13 oz, Caucasian female. Normal.	95, age 3 mo
4 lb, 6½ oz, Caucasian male. Age 2 mo bilateral inguinal hernia.	103, age 13 mo
8 lb, 2½ oz, Caucasian male. Normal.	133, age 6 mo
9 lb, 4 oz, Caucasian male. Normal.	109, age 4 mo
7 lb, 6 oz, Negro male. Normal.	91, age 9 mo

many children:† a branchial cleft cyst, unilateral cryptorchidism, bilateral inguinal hernia (male), and ptosis of the left eye. Only the branchial cleft cyst would be termed "major" by the criteria of Schull and Neel.[2] The range of I.Q. in the 15 children who were recommended for adoption was 91 to 133, average 105.

COMMENT

The frequency of death-plus-major defect[2,3] in the comparison group was 1 in 18 ($5.6 \pm 5.4\%$) and in the children of incest, 6 in 18 ($33.33 \pm 11.1\%$). In addition, three of the children of incest, on the basis of repeated intelligence tests, are probably functioning in the retarded range. Interestingly, these children were not born to the mothers felt to be mentally subnormal. The present series thus suggests that the children of incest are a "high-risk" group, to the extent that the pediatrician consulted concerning the early placement of such a child is well advised to evaluate the child with special care.

Schull[4] reported that in a large cohort of newborn Japanese infants the frequency of death-plus-major congenital defect was 4.3% in the control children and 6.2% in the offspring of first cousins. Neel and Schull,[5] and Schull and Neel[2] found that in a subset of the same cohort followed until an average age of 8 years (the evaluation now included a judgment concerning mental retardation) the frequency of death-plus-major defect was estimated as 17.4% in controls and 22.4% in the children of first cousins. Although there has been a wide variation in the results of other studies on this problem, Schull and Neel,[2] after a review of the existing data, concluded that the differences might all be explained by sampling error and "experimental design" and that there was as yet no compelling evidence for real differences in inbreeding effects from area to area and race to race. The above quoted Japanese studies are near the mean of the various studies to date; we, therefore, feel justified in using them for purposes of comparison. The data suggest that, in round terms, no more than 4 to 5% greater frequency in death-plus-defect would be expected in the children of first cousins than in control children under the circumstances of the Japanese study. In the children of a first cousin marriage, the probability that a child will be homozygous for a specific gene present in one of the two grandparents is .0625. In a child of incest, this same probability is 0.250. Accordingly, a simple linear extrapolation from these studies on the effects of inbreeding in first cousins to the outcome of incestuous union would call for no more than a 16 to 20% increase in death-plus-defect in children such as we have studied. The observed increase is 28%.

Chance is, of course, the most likely explanation of the discrepancy between observation and expectation in this small series. In this connection it should be noted that, in view of the high risk of still birth, neonatal death, and congenital defect in the children of very young mothers,[6-9] the record of the comparison group appears to be better than would usually be the case.

† Although the diagnosis of acetabular dysplasia was made three times by competent pediatricians in these 38 children, the difficulties with this diagnosis in the newborn[10] are such that it has not been included in the calculations although it is listed in the tables.

TABLE IV

RESULTS OF EXAMINATIONS: FATHER-DAUGHTER INCEST GROUP

Kindred Number	*Physical*	*Developmental Quotient*
8905	7 lb, 5 oz, Caucasian male. Normal.	114, age 6 mo
8198	6 lb, 3¼ oz, Caucasian male. Failure to thrive, cortical atrophy, spastic cerebral palsy, seizures.	Severe retardation
8886	7 lb, 8 oz, Caucasian male. Bilateral cleft lip.	92, age 11 mo
8098	8 lb, 9 oz, Caucasian male. Normal. n.b. Unsuccessful abortion attempt during third month.	113, age 6 mo
8199	1,100 gm, Negro male. Died age 6 hr. Autopsy: nondiagnostic.	None done
7691	6 lb, 2 oz, Negro female. Normal.	98, age 9 mo

although for lack of truly comparable data a precise statement is impossible. However, two other possible explanations must be considered. One is that the incestuous and the non-incestuous unions have not been properly matched, especially as regards mental attributes or certain psychic factors whose role in pregnancy outcome remains ill-defined.[1] In this connection, it should be recalled that the three borderline mentally defective infants born to the incestuous unions have not been included in these percentages. In view of the unusual nature of incestuous unions, it is obvious that this possibility will not be easily disposed of in this or any other study. The other possibility is that the regression of death-plus-major defect on inbreeding is non-linear in man, implying synergism in the action of genes rendered homozygous through inbreeding.[2,10]

The preliminary nature of the present data is apparent. The event under consideration is rare. The 18 children described in this paper were ascertained between January 1961 and March 1965. During this period an additional nine pregnancies resulting from incestuous unions were ascertained after the mother had delivered or under other circumstances excluding them from the study, for which reason the resulting children were not included in this report. On the basis of extensive contacts with the various agencies concerned, we estimate that at least 20 such pregnancies may occur in the state of Michigan annually. There is no reason to postulate that Michigan is unusual in this respect. It is to be hoped that the future will bring further reports on this important source of genetic information, especially in view of the provocative aspects of the present findings.

SUMMARY

Eighteen prospectively ascertained cases of brother x sister and father x daughter matings are described. A series of illegitimate children whose mothers were as nearly matched as possible to the incest mothers for intelligence, age, height, weight, and socioeconomic conditions were used as controls. Six of the children of incest had died or were found to have major defects on follow-up 6 months after birth date, whereas one of the comparison children was so classified. This is a larger inbreeding effect than would be predicted on the basis of published findings from marriages of first cous-

TABLE V

RESULTS OF EXAMINATIONS: FATHER-DAUGHTER COMPARISON GROUP

Physical	*Developmental Quotient*
7 lb, 6 oz, Caucasian female. Normal.	83, age 13 mo
10 lb, 10 oz, Caucasian male. Branchial cleft cyst.	93, age 13 mo
7 lb, 9 oz, Caucasian male. Normal.	108, age 17 mo
5 lb, Caucasian female. Ptosis left eyelid. Recurrent pneumonia, sweat chloride 18 mEq/l.	80, age 9 mo
6 lb, 1 oz, Negro female. Normal.	91, age 11 mo
5 lb, 15 oz, Negro female. Normal.	104, age 8 mo
	108, age 7 mo

ins. The series is published at this time to encourage others to collect these important, but rare and elusive data, in a prospective, controlled manner.

REFERENCES

1. Stott, D. H.: Cultural and natural checks on population growth. *In* Montagu, M. F. A., ed.: Culture and the Evolution of Man. New York: Oxford University Press, pp. 353–376, 1962.
2. Schull, W. J., and Neel, J. V.: The Effects of Inbreeding on Japanese Children. New York: Harper and Row, 1965.
3. Neel, J. V.: A study of major congenital defects in Japanese infants. Amer. J. Hum. Genet., 10:398, 1958.
4. Schull, W. J.: Empirical risks in consanguineous marriages: sex ratio, malformation, and viability. Amer. J. Hum. Genet., 10:294, 1958.
5. Neel, J. V., and Schull, W. J.: The effect of inbreeding on mortality and morbidity in two Japanese cities. Proc. Nat. Acad. Sci. U.S.A., 48:573, 1962.
6. Neel, J. V., and Schull, W. J.: The effect of exposure to the atomic bombs on pregnancy termination in Hiroshima and Nagasaki. Washington, D.C.: National Academy of Sciences, National Research Council Publication, 461, pp. XVI and 241, 1956.
7. Yerushalmy, J.: Neonatal mortality by order of birth and age of parents. Amer. J. Hyg., 28:244, 1938.
8. Newcombe, H. B.: Screening for effects of maternal age and birth order in a register of handicapped children. Ann. Hum. Genet., 27:367, 1964.
9. Milham, S., and Gittelsohn, A. M.: Parental age and malformations. Hum. Biol., 37:13, 1965.
10. Malogolowkin-Cohen, C., Levene, H., Dobzhansky, N. P., and Solima Simmons, A.: inbreeding and the mutational and balanced loads in natural populations of Drosophila Willistoni. Genetics, 50:1299, 1964.
11. Caffey, J., Ames, R., Silverman, W., Ryder, C., and Hough, G.: Contradiction of the congenital dysplasia—predislocation hypothesis of congenital dislocation of the hip through study of normal variation in acetabular angles at successive periods in infancy. PEDIATRICS, 17:632, 1956.
12. U.S. Department of Commerce: Alphabetical index of occupations and industries, Sixteenth census of the United States, 1940.

Acknowledgment

The authors are particularly in the debt of Mrs. Ruth T. Davidson, medical social worker at the Department of Human Genetics, who was active in all phases of the study. We greatly appreciate the skill and objectivity of Dr. Ralph Gibson of the Department of Pediatrics, who did the psychometric evaluations. His continuing interest in the face of his overcrowded schedule was immeasurably valuable.

The sincere whole-hearted cooperation of the many child placement agencies of the state of Michigan was most gratifying. We acknowledge in particular those agencies which referred the children included in this study: Michigan Children's Aid Society, Bethany Christian Home, D. A. Blodgett Homes for Children, St. Agnes Foundling Home, Bureau of Social Aid of Kalamazoo County, and Children's Division, State of Michigan Department of Social Service.

Document #17

How Patients View Mandatory Waiting Periods for Abortion

By Michael Lupfer and Bohne Goldfarb Silber

Summary

In recent years, various legislatures have enacted laws and ordinances mandating a waiting period for women seeking to obtain abortions. Legal challenges to such statutes have been successful, except in one instance (Akron, Ohio), and a federal judge in Tennessee recently struck down a waiting period statute.

As part of the appeal against the Tennessee law, two surveys were made of some 400 women who experienced such a delay to probe their opinions about the benefits and drawbacks of the mandated waiting period. More than seven in 10 women were unable to name a single benefit to be derived from waiting, and six in 10 pointed to one or more problems they had experienced, including extra expense, missed work or school, experiencing some discomfort and entering the second trimester of pregnancy, among others. About $7,600 in extra expenses were incurred by about 200 of the women (with a median of $24 per woman), adding about 48 percent to the costs for the typical low-income woman and 14 percent for the typical higher income woman. The cost of the second visit increased in direct proportion to the distance a woman lived from the family planning clinic and to the number of hours she was employed per week. The typical woman was found to hold a negative view of the statute. Women who were surveyed before and after the waiting period said that they actually realized fewer benefits and experienced more problems from the waiting period than they had anticipated.

Seven in 10 women required to go through a waiting period prior to obtaining an abortion said that they disapproved of such a delay. Waiting periods raised the cost of the procedure for typical low-income women by at least 48 percent and for higher income women by 14 percent.

Introduction

Laws requiring waiting periods have been overturned or enjoined in Illinois, Louisiana, Maine, Massachusetts, Missouri, Nebraska, North Dakota and Rhode Island.[1] There have been conflicting opinions in Kentucky about the constitutionality of waiting periods. In 1976, the U.S. Court of Appeals for the Sixth Circuit upheld the constitutionality of a 24-hour waiting period imposed by a 1974 Kentucky law.[2] In December 1980, however, a federal district court struck down that law. In doing so, the district court pointed out that unlike the plaintiffs in the case being heard, the plaintiffs in the earlier sixth circuit case did not present any evidence that the waiting period "would, in effect, impose increased health risks or increased financial burdens upon pregnant women seeking an abortion."[3] A waiting period requirement has been upheld in Akron, Ohio, and is being appealed; a similar law had been in effect in Tennessee,[4] but was struck down on March 23 by the federal court in which the case had been pending.[5] The court held that the waiting period imposed an undue burden on the women.

The Tennessee statute, originally adopted in March 1978, required that a woman seeking an abortion, after being examined by her physician and informed of the "benefits and risks . . . attendant either to continued pregnancy and childbirth or to abortion,"[6] must wait at least two days before having an abortion. The penalty for ignoring the waiting period was one to three years' imprisonment of the physician who performed the abortion.

Efforts to challenge the Tennessee law began as soon as it went into effect in September 1979; although the issue has been resolved in that state, the effort to impose mandatory waiting periods may continue in other jurisdictions. One aspect of the Tennessee case is, therefore, of special interest. Attorneys for the plaintiffs, reviewing similar cases elsewhere, noted that no attempt had been made to evaluate systematically and empirically the impact of the law, i.e., to gauge the effect of the mandatory waiting period on women seeking abortion. We were commissioned to assess the law's impact, by conducting two surveys of women who were candidates for abortions at clinics in Memphis and Knoxville from October 1979 through January 1980.*

The surveys were designed to measure the benefits and costs of the waiting period for abortion candidates: What benefits did the women believe they derived by waiting? What problems did the waiting period create for them? What costs, if any, did they incur by having to return to the clinic a second time? In addition, we wanted to determine whether the women favored or opposed the required waiting period.

The first survey focused on women who had already completed the waiting period. The second survey, identical in content to the first, questioned women both before and

Michael Lupfer is Professor of Psychology and Bohne Goldfarb Silber is a doctoral student in the Department of Psychology, Memphis State University, Memphis. The authors acknowledge the assistance of the staffs of the Memphis Association for Planned Parenthood, the Memphis Center for Reproductive Health and the Knoxville Center for Reproductive Health in conducting the surveys reported in this article. In addition, they are indebted to Gail O. Mathes, counsel for the Memphis Association for Planned Parenthood, and G. Philip Arnold and Thomas M. Daniel, attorneys for the West Tennessee American Civil Liberties Union, who served as the plaintiff's legal team. A different version of this article was submitted as an exhibit in the case of *Planned Parenthood of Memphis et al.* v. *Alexander et al.*, Case No. C-78-2310, U.S.D.Ct. W.D. Tenn. (1978).

*The surveys were commissioned by the Memphis Association for Planned Parenthood.

after the waiting period, to determine whether any appreciable change in outlook had occurred as a result of waiting.

Respondents and Interviews

A total of 332 women constituted the sample in the first survey.* They were randomly drawn from among abortion candidates at three clinics in Memphis and Knoxville, in numbers reflecting the proportionate volume of patients treated at the three centers. All of the women were interviewed during October–December 1979; prior to the interview, they all had received counseling, had been examined by a physician, had completed the mandatory wait and had signed the necessary consent forms for abortion.

Goodness-of-fit tests indicated that the sample was comparable to the population of Tennessee's women who have obtained abortions in terms of age, but contained 10 percent more nonwhites. In addition, the sample consisted entirely of women seeking abortions at outpatient, freestanding clinics, whereas only 88 percent of all abortion patients in Tennessee have obtained the procedure at such clinics; the remainder did so at hospitals or physicians' offices.[7]

Ninety-four women, all of whom were patients at the Memphis Association for Planned Parenthood's abortion clinic, were asked to participate in the second survey, conducted during the period January 12–24, 1980. All had already received abortion counseling and undergone laboratory tests, and were awaiting medical examinations, prior to the waiting period. Four of the 94 indicated uncertainty about proceeding with the abortion; to avoid any possibility that the interview itself might influence their decision, these women were not interviewed. The other 90 women completed the interview prior to the waiting period, and 73 of them, upon returning to the clinic after the waiting period, were reinterviewed.†

In the first survey, 69 percent of the respondents were white; 32 percent were teenagers and 40 percent were aged 20–25; 55 percent had no children and 26 percent had one; 62 percent were employed; 33 percent were students; 52 percent lived in the city where the clinic was located; 55 percent were interviewed at the Memphis Association for Planned Parenthood. In the second survey, the proportion of whites was slightly lower (60 percent); the proportion with no children, slightly higher (62 percent); and all the respondents were interviewed at the Memphis Association for Planned Parenthood.

All interviews for the first survey were conducted by counselors employed at the three clinics. These counselors, all of whom had a great deal of interviewing experience, were given instructions which stressed the importance of maintaining complete neutrality. They were admonished neither to express their own views nor to comment on the respondents' views. In addition, the counselors' interviews were spot-checked by their supervisors to assure reliability. The project directors monitored the recorded interviews to check for accuracy and completeness. As a result of this scrutiny, 51 of the original 383 interviews in the first survey were discarded as incomplete or possibly unreliable, reducing the final sample to 332 interviews.

The majority of the interviews for the second survey were conducted by a graduate student in psychology, and full-time counselors at the Memphis Association for Planned Parenthood conducted the remainder. Once again, all interviewers were given thorough instructions for conducting the interviews. None of the abortion candidates was interviewed by the same individual who had served as her abortion counselor.

Three drafts of the interview schedule were tested before the schedule used in the first survey was adopted. The interview schedule began with open-ended questions which permitted respondents to express their views in their own words, and progressed to specific, standardized attitude statements with which respondents were asked to agree or disagree. Every attempt was made to ensure that the open-ended questions were unbiased. Even in the latter part of the interview, when declarative attitude statements were introduced, statements were included that reflected both favorable and unfavorable attitudes toward the statute. (Six of the 10 attitudinal statements were favorable, and four were unfavorable; a slight positive bias was thus injected in the latter part of the interview.)

Deciding to Have an Abortion

The first questions in the earlier survey assessed the amount of time respondents took to decide to have an abortion, and also the amount of time that elapsed between the date of the decision and the date of the abortion itself. The majority of respondents (59 percent) said that they had decided to have an abortion within 24 hours after receiving confirmation of their pregnancy, although the range of responses was 0–75 days. Two overlapping groups of women—black women and mothers of two or more young children—reported, however, that they had deliberated 2–3 days, on the average, before reaching the decision to have an abortion. Once having made the decision, white women most typically obtained the abortion 14 days later and black women, 21 days later.

The overwhelming majority of women (88 percent) reported that they had talked with at least one person prior to meeting with the clinic counselor. Most commonly, respondents indicated that they had talked with their partner (42 percent) or a close friend (35 percent) about the advisability of an abortion. Less frequently, the respondents stated that they had talked with their mothers (17 percent); fathers (three percent); other relatives, including siblings or aunts (12 percent); health professionals, such as nurses or family physicians (seven percent); ministers or guidance counselors (two percent); or others (two percent).

The Benefits and Costs of Waiting

Early in the interview, respondents were reminded of the waiting-period requirements and were asked, "Did you gain any benefits by waiting a few extra days to have the abortion?" Seventy-seven percent of the women were unable to name a benefit, whereas 23 percent named one or more. Among the benefits were the following:

- had time to consider the wisdom of the decision (15 percent);
- had time to adjust psychologically (seven percent);
- had time to learn about the medical aspects of abortion (four percent);
- had time to consider effects of abortion on others (two percent); and
- other (two percent).

In response to the question "Did waiting a few extra days create any problems for you?" 41 percent were unable to name any problems, while 59 percent identified one or more problems. Among the problems named were these:‡

- experienced additional mental anguish (29 percent);
- incurred additional transportation expenses (24 percent);

*We calculated with 95 percent confidence that percentage estimates drawn from a sample of this size contained sampling errors of 4–6 percent.

†The remaining 17 women were not reinterviewed for the following reasons: Seven returned to the clinic to complete the abortion procedure after interviewing had ceased; four were discovered to have entered the second trimester of pregnancy and were referred elsewhere; two were referred elsewhere for medical problems and did not return; two decided to continue their pregnancies; one miscarried during the waiting period; and one did not return for unknown reasons. The responses of these 17 women to the initial interview questions were compared with the responses of the 73 women who were reinterviewed; no significant differences were found.

‡This was an open-ended question, and the women did not include financial matters pertaining to the waiting period as among the problems (although some did make mention of additional transportation costs and work missed). Either the question was not clear enough or costs were placed in another category in the respondents' minds.

- experienced additional nausea (19 percent);
- missed additional time at work (15 percent);
- had to make up extra excuses to explain absences (15 percent);
- others had to miss additional time at work to transport me (eight percent);
- missed additional time at school (six percent);
- had to arrange for additional babysitters (five percent);
- may have entered fourth month of pregnancy (one percent); and
- other (seven percent).

Table 1. Percentage of respondents agreeing with, disagreeing with or undecided about various statements concerning the waiting period, Memphis and Knoxville, 1980 (N=332)

Statement	Percent		
	Agree	Disagree	Undecided
The required waiting period has been beneficial because it has given me time to think to be sure I was doing the right thing.	42	55	2
I'm afraid that postponing the abortion for a few days has increased the chance that people will find out.	36	58	6
Postponing the abortion has been helpful because it has given me extra time to prepare myself mentally for what's to come.	39	55	6
The few days of required waiting have not made me any more nervous than I was already.	44	55	1
I thought carefully about the morality of having an abortion before coming here the first time. I didn't need the required waiting period to think more about that question.	82	16	2
Even though I've experienced some nausea and stomach upset during this pregnancy, the extra days of waiting have not added to my discomfort.	43	53	5
The required waiting period has been beneficial because I have learned more about the medical aspects of abortion during the wait.	35	62	3
Having to wait for the abortion has caused a lot of added stress and worry about my condition.	60	36	3
The required waiting period has been helpful because it has given me a chance to reconsider the abortion with people close to me.	30	69	2
Having to make an extra trip here has forced me to make up additional excuses and "stories" to explain my absences.	51	47	2

Economic Impact

The statute, because it required multiple visits to clinics, increased the costs of health care for many women seeking abortions. Of the 332 women interviewed for the first survey, 313 were able to provide estimates of the costs of compliance with the statute. Of these, 62 percent reported that the necessity of returning for a second visit cost them additional money in terms of reduced salary, transportation expenses or additional child-care expenses.* For the 194 women who reported additional expenses because of the required second visit, the total cost was $7,602, and the median was $24 per woman. Since the cost of the abortion itself ranged from $50 to $175, depending upon the woman's economic circumstances, compliance with the statute increased costs for the typical low-income woman by at least 48 percent and for the typical higher income woman by at least 14 percent.

We submitted each woman's expenses resulting from compliance with the statute to regression analysis to detect factors which contributed most directly to her expenses. Two factors were identified: the distance a woman lived from the clinic and the number of hours she was employed each week.† Compliance was more costly for women in rural than in urban areas and for women who were employed than for women who did not work. Regression analysis produced no evidence that the costs of compliance with the law differed according to the women's race, age, income level or student status.

The costs of compliance were broken down into components, and each was examined in detail:

- *Transportation expenses.* Forty-eight percent of all respondents lived in communities other than the one in which they were being treated—typically, some 80 miles from the urban center where the clinic was located. Among all respondents, including those who lived in the city where they were to obtain the abortion, 59 percent reported having to bear extra transportation expenses in order to return for the second visit. The median additional cost was $15.
- *Employment and salary.* Sixty-two percent of the sample reported that they had full-time or part-time jobs. Sixty percent of employed women stated that they had to miss time at work in order to return for the second visit, and 41 percent of all jobholders reported losing pay because of the required second visit. The median amount of pay lost by jobholders was $32.
- *Child-care expenses.* Forty-five percent of respondents were mothers—typically, with one or two young children at home. Among mothers with young children, 57 percent had to arrange for additional child care in order to return for the second visit, and 22 percent had to pay for this extra child care. The median payment was $10.

In addition, students comprised 33 percent of the sample; about 41 percent of the students had to miss classes in order to comply with the statute. On the average, students missed two additional days of classes in order to make the second visit.

Attitudes Toward the Statute

Part of the interview was devoted to assessing the women's attitudes toward the mandatory waiting period. Two types of attitude measurement were used: a structured question soliciting the women's attitudes; and a Likert-type attitude scale requiring respondents to agree or disagree with a series of opinions about the waiting period.‡

All respondents were asked: "As you know, the law has required you to wait a few days before having the abortion. Do you think that was a good idea, or would it have been better to have the abortion on your first visit here?" Seventy-one percent of the women in the first survey reported that they believed the law was not a good idea, compared with 26 percent who considered it a good idea. About three percent indicated that they were undecided about the law's merits.

As Table 1 shows, the majority of women

*Respondents were not asked to estimate the cost of lodging or income lost by family members or friends who missed work to provide transportation.

†Standardized correlation coefficients (beta) = 0.40 and 0.27, respectively.

‡Responses to the two types of questions were significantly correlated (r=0.64). This coefficient, plus the Cronbach's alpha coefficient of 0.82 for the Likert attitude scale, provided evidence for the reliability of the measures. (For a discussion of Cronbach's alpha coefficient, see: J. C. Nunnally, *Psychometric Theory*, 2nd ed., McGraw-Hill, New York, 1978, pp. 229–230.)

also expressed negative attitudes toward the statute in responding to the 10 statements forming the Likert attitude scale. Their responses to the statements were aggregated to yield for each woman a single attitude score on the scale. Scores on the Likert scale ranged from 10, indicating maximum approval of the statute, to −10, indicating maximum disapproval of the statute, with 0 being the neutral point. The mean score for all women was −1.9, suggesting that the typical woman had a negative view of the statute mandating a waiting period.

We submitted the composite attitude scores to regression analysis to identify factors which distinguished supporters from opponents of the statute. Seven significant factors emerged and are listed below, in decreasing order of their power to discriminate opponents from supporters. Opponents of the statute, who constituted the majority of the respondents, tended to be women who reported no benefits from the waiting period, could name one or more problems created by the wait, reached the decision to have an abortion in a short period of time, were older, were white, incurred extra transportation expenses because of the required second visit, and were patients at the Memphis Center for Reproductive Health.

The minority of women who favored the required waiting period were distinguished primarily by their ability to name one or more benefits but no problems resulting from the mandatory wait; by their tendency to take a longer time to reach a decision to have an abortion; by their youth; and by their not incurring any extra transportation expenses.

Views Before and After Waiting

The primary purpose of the second survey was to determine whether the women's views of the required waiting period had changed from the first clinic visit, before they had gone through the waiting period, to the second visit, after they had experienced the mandatory wait.

Although there was a high correlation* between the responses made at the first and second interviews, respondents' expectations about the benefits and costs of the waiting period proved to be significantly different from the benefits and costs they actually experienced. Table 2 shows that the women realized fewer benefits and more problems from the wait than they had anticipated. When initially asked, "Do you think you will gain any benefits by waiting a few days to have the abortion?" 16 percent of the women were able to name one or more expected benefits. This proportion dropped to seven percent by the end of the required waiting period.

More striking were changes in response to the question, "Do you think that waiting a few days for the abortion will cause any problems for you?" Prior to the waiting period, 46 percent anticipated one or more problems. This proportion rose to 64 percent following the mandatory wait, the increase being due primarily to four problems (not shown): more nausea and physical discomfort than expected (a shift from 10 percent who anticipated this problem to 25 percent who experienced it); a greater occurrence of mental anguish (from 10 percent to 25 percent); a greater need to lie and make excuses to explain absences (from one percent to 12 percent); and a greater incidence of transportation expenses (from 16 percent to 25 percent).

The actual financial costs of returning for the second visit also turned out to be greater than expected for the women in the second survey. At the time of counseling, the typical woman expected that the necessity of a second visit would cost her approximately $15 in terms of reduced salary, extra transportation expenses and additional child-care expenses. In fact, the median cost was $29 per respondent.

Table 2. Comparison of responses to key questions before and after the waiting period, and scores on the Likert attitudinal scales, by various measures (N=73)

Measure	Before waiting period	After waiting period	Test of significant change
% who could name no benefits of required wait	84	93	z=2.40*
% who could name one or more benefits	16	7	
% who could name no problems caused by required wait	54	36	z=2.99†
% who could name one or more problems	46	64	
Total cost incurred by having to make 2nd visit	$15	$29	t=6.07†
% who thought waiting period a good idea	25	21	z=0.82
% who disapprove of wait	70	73	
% undecided	5	5	
Mean scores on Likert attitude scale‡	−2.0	−2.5	t=1.56

*p<0.05. †p<0.01. ‡Scores range from −10 to +10.

Attitudinal Change

We also examined the women's attitudes toward the statute before and after the required waiting period. As shown in Table 2, both measures of women's attitudes (their responses to the structured question and their scores on the Likert attitude scale) revealed slight but nonsignificant shifts in the direction of greater opposition to the statute. Before experiencing the waiting period, 70 percent of the women disapproved of the required wait. This proportion increased to 73 percent by the time of the second visit.

During the same period, mean scores on the Likert attitude scale shifted slightly, from −2.0 to −2.5.† Altogether, the data suggest that no overall change in attitude toward the statute occurred as a function of experiencing the required wait.

Survey Data as Legal Evidence

Portions of the foregoing report were submitted on February 7, 1980, as an exhibit in a suit brought by the Memphis Association for Planned Parenthood against the state of Tennessee. The senior author was subsequently called to testify about the report. Most of the questions raised in cross-examination pertained to the methodology of the surveys, and specifically to the issue of interviewer bias.

We would like to describe more fully our responses to questions about interviewer bias because this issue figured so prominently in cross-examination. All the interviews in the first survey and a portion of the interviews in the second were conducted by family planning counselors who were employees of the plaintiff. For this reason, and also because many of the counselors were assumed to oppose the mandatory waiting period, the defense attorneys alleged that the counselors might have allowed their personal opinions to bias the interviewing process. According to this argument, the re-

*Test-retest correlations were all positive (from 0.47 to 0.87) and significant at the p<0.01 level.

†Because the composite score on the Likert scale was based on 10 responses, we assumed it was a more sensitive and reliable measure of attitude than the responses to the single question. The correlation coefficients (not shown in Table 2), which may be viewed as test-retest coefficients of reliability, support this assumption.

sponses of abortion candidates might not have reflected their own opinions as much as they reflected the biasing influence of the interviewers.

We acknowledged the potential danger of interviewer bias and pointed out the steps taken at the beginning of the project to minimize the danger: A detailed interview schedule to be followed precisely by the interviewers was written, leaving no opportunity for improvisation; declarative attitude statements were used, of which 60 percent expressed a favorable attitude toward the mandatory wait and the rest, a negative attitude (see Table 1); and the interviewers were given training which stressed the importance of neutrality. In addition, we pointed out that for the second survey, a graduate student in psychology who had no affiliation with any family planning organization conducted all of the interviews prior to the waiting period, as well as many of the interviews following the waiting period. The responses obtained in this survey by the graduate student (shown in Table 2) were remarkably similar to the responses obtained by the counselors in the earlier survey.

A further argument against the allegation of negative interviewer bias invoked the research literature on social influence. Several investigators[8] have found that susceptibility to social influence diminishes with age, i.e., that young adolescents are more susceptible than late adolescents, who, in turn, are more susceptible than adults. Accordingly, if the interviewers in the first survey were conveying a negative bias toward the statute and influencing respondents to conform to this bias, then we should have found the youngest girls expressing the most negative attitudes. In fact, the opposite results were obtained. Respondents under 18 years of age comprised the only age-group to express a favorable attitude toward the waiting period, their mean on the Likert scale being 0.7, compared to means of −0.8 for women aged 18–22, −3.5 for women aged 23–30, and −4.5 for women aged 31–40.

Therefore, we concluded that there was no tangible evidence to support the charge that negative interviewer bias accounted for the results obtained in the surveys.

References

1. *Charles* v. *Carey*, No. 79-2389 (7th Cir., July 29, 1980); *Margaret I.* v. *Edwards*, 488 F.Supp. 181 (E.D. La. 1980); *Stewart* v. *Petit*, 477 F.Supp. 542 (D. Me. 1979); *Planned Parenthood League of Mass.* v. *Belotti*, No. 80-1580 (1st Cir., Feb. 9, 1981); *Planned Parenthood Ass'n of Kansas City, Mo., Inc.* v. *Ashcroft*, 483 F.Supp. 679 (W.D. Mo. 1980); *Women's Services* v. *Thone*, 483 F.Supp. 1022 (D. Nebr. 1979); *Leigh* v. *Olson*, 497 F.Supp. 1340 (D. N.D. 1980); and *Women's Medical Center of Providence, Inc.* v. *Roberts*, Civil Action No. 880-0292 (D. R.I., July 3, 1980).

2. *Wolfe* v. *Schroering*, 541F 2 dd 523 (6th Cir. 1976).

3. *Wolfe* v. *Stumbo*, Civil Action No. C-80-0285 L (A) (W.D. Ky. Dec. 3, 1980).

4. *Akron Center for Reproductive Health, Inc.* v. *City of Akron*, 479 F.Supp. 1172 (N.D. Ohio 1979); and *Planned Parenthood* v. *Blanton*, No. 78-2310 (W.D. Tenn. Aug. 31, 1979).

5. *Planned Parenthood of Memphis et al.* v. *Alexander et al.*, No. 78-2310 (W.D. Tenn. Mar. 23, 1981).

6. Tennessee Code Annotated, Section 39-302.

7. Tennessee Department of Public Health, *Induced Abortions Reported in Tennessee, 1976–1977*, Nashville, April 1979, summary table.

8. W. R. Nord, "Social Exchange Theory: An Integrative Approach to Social Conformity," *Psychological Bulletin*, 71:198, 1969.